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SAN Configuration Guide

HDS Storage

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QLogic SAN Configuration Guide for HDS Storage

Version 5.0

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QLogic Corporation
26650 Aliso Viejo Parkway
Aliso Viejo, CA 92656
Phone: (949) 389-6000 or (800) 662-4471
Fax: (949) 389-6009

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Introduction

The *QLogic SAN Configuration Guide for HDS Storage* is a comprehensive resource for developers and consultants interested in deploying QLogic solutions.

How to Use This Guide

This guide provides detailed solution configurations and interoperability information, which allow you to deploy a QLogic-powered SAN. Updated versions of this guide can be downloaded from the QLogic website at: http://www.qlogic.com/interopguide.

End-to-end interoperability not only includes switches, host bus adapters (HBAs), and storage products; it also extends to the component level. Therefore, this guide includes detailed information outlining the exact configurations tested by QLogic and the procedures necessary to deploy a SAN.

For More Information

Since 1993, more than 50 million QLogic products have shipped inside storage solutions from Cisco, Dell, EMC, HP, IBM, NEC, Network Appliance, and Sun Microsystems. In 2004, QLogic was named to *Fortune* magazine's 100 Fastest Growing Companies and *Forbes* magazine's Best 200 Small Companies lists.

Additional QLogic resources can be found at the following locations:

Fibre Channel Host Bus Adapters

http://www.qlogic.com/products/fc_san_hostadapers.asp

Fibre Channel Switches

http://www.qlogic.com/products/fc_san_switchs.asp

QLogic Technical Support

http://www.qlogic.com/support/

Interoperability Guides from QLogic Press

http://www.qlogic.com/interopguide/

Statement of Support

QLogic understands the unique needs and complexities of each and every SAN. As a result, the QLogic SANtrack™ Service and Support Program provides customers with a flexible way to create a unique service and support package designed specifically to meet your distinct business requirements.

QLogic switch products allow a wide range of organizations to exploit the power of a SAN. Whether it's a fast growing small firm implementing a network with 10-20 devices or a Fortune 100 Corporation creating a large infrastructure with thousands of devices, QLogic SANtrack Service and Support Program effectively addresses either set of business requirements.

The SANtrack Service and Support Program is a diverse offering of a range of services including: Select and Prime service plans, Pre-Install Analysis, Installation, On-Site and Spare Upgrades. Customers may choose among the services that best meet the demands of their business. Most importantly, customers are assured complete satisfaction since QLogic and its qualified partners fully guarantee all products and services.

NOTE: For additional information on support, please see the QLogic website at: http://www.qlogic.com/support/warranty_santrack.asp.

Test Philosophy

The QLogic SAN configuration test philosophy is broken down into two test levels:

- Application-level interoperability
- Device-level interoperability

Application-Level Interoperability Test

The application-level interoperability test ensures that applications such as backup/restore, LAN-free back-up, serverless backup, and server clustering will run as designed on a combinations of hardware components that are representative of customer configurations. At this level, the hardware configurations are, for the most part, complex and can involve numerous devices that differ by type, vendor and operating system. Since the objective of this test is to determine the feasibility of typical customer SAN solutions, not every function of the application can be tested. While the application-level interoperability test addresses the major functions of the application, successful completion of the test does not guarantee full interoperability. However, it does provide a reasonably high level of confidence that the application will function well in most SAN solution scenarios.

Device-Level Interoperability

The device-level and system integration test verifies functionality of the device with additional hardware and software. The interoperability and system integration test ensures conformance with the ANSI Fibre Channel (FC) standards and interoperability between servers and storage.

Server Interoperability

This ensures there are no problems between the HBA and the server. Potential problems, which may be found in this testing, include incompatibility between the HBA and server PCI chipsets, and conflicts between the HBA driver/BIOS setting and drivers/BIOS setting of other installed devices/adapters in the server.

Storage Interoperability

Storage devices such as disk arrays and tape devices are tested with SAN hardware and HBAs. This ensures compatibility between the end device and SAN hardware. Potential problems that may be found include improper LIP handling, AL_PA and Worldwide Name problems, jitter, and so on.

Application Device-Level Interoperability

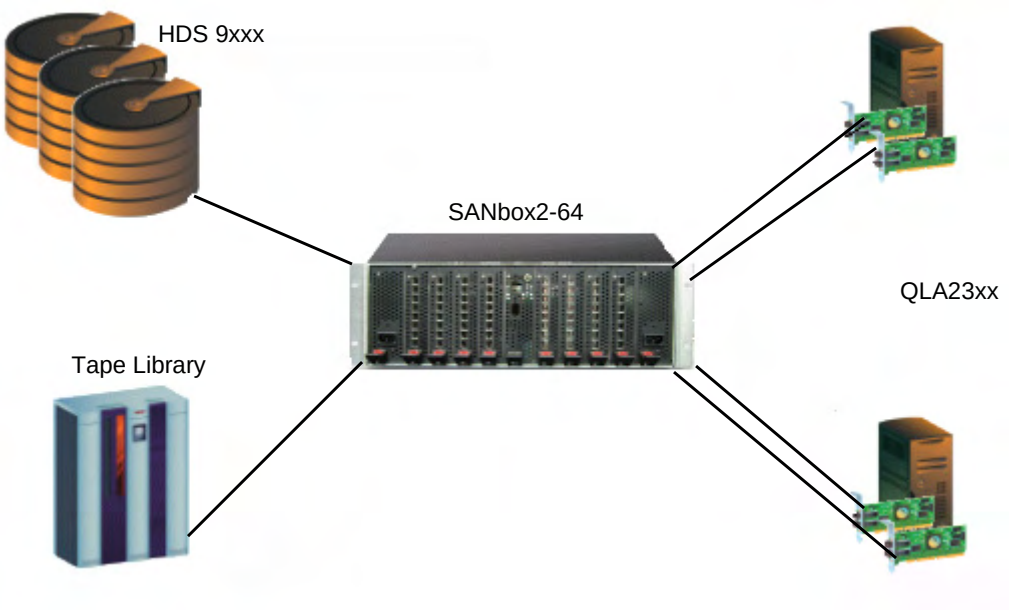
The application device-level interoperability test ensures coexistence with the operating system environment and typical user shrink-wrapped software. It also ensures that the software works with the applicable hardware. In the case of a Windows environment, the component should have successfully completed all applicable Microsoft Hardware Certification program tests.

Tested SAN Configurations

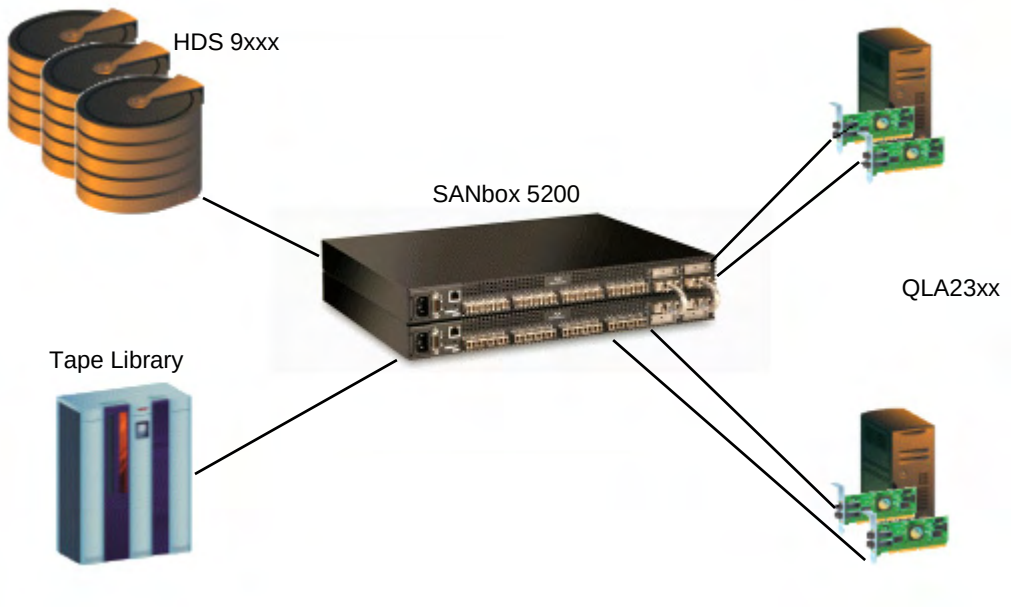
The following SAN illustrations show several different configurations and components certified by QLogic. Your configuration details may differ.

NOTE: For information on multi-vendor switch configuration, please see the *Switch Interoperability Guide* at http://www.qlogic.com/interopguide.

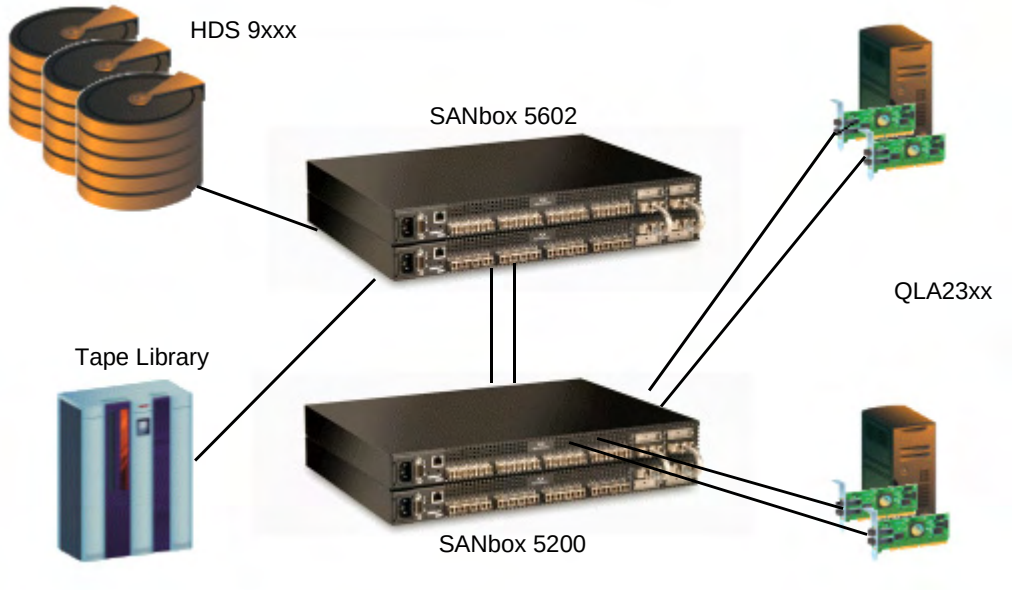
Single-Switch Configuration: SANbox2-64



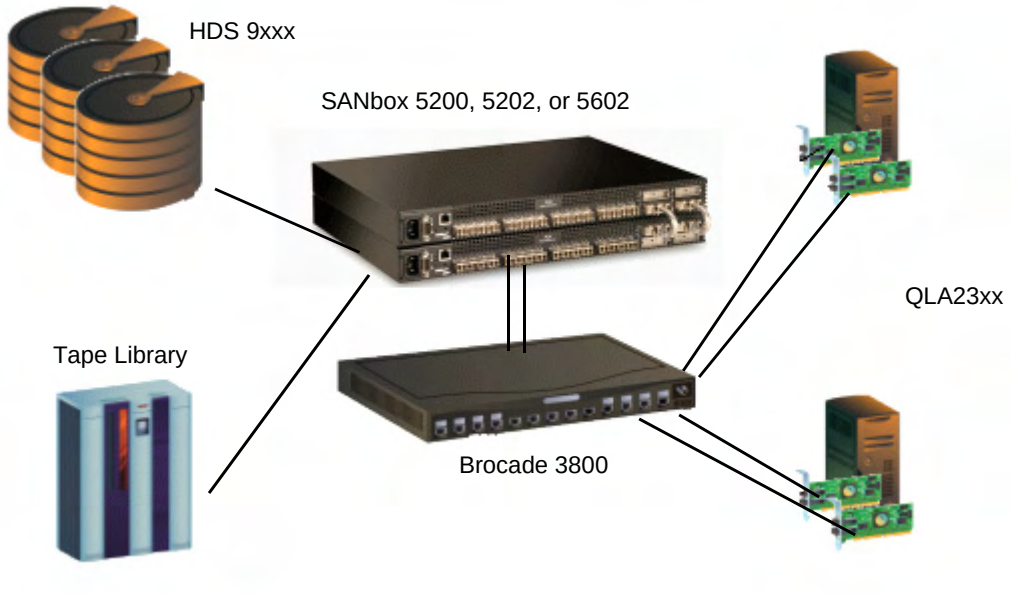
Cascade Configuration: SANbox 5200



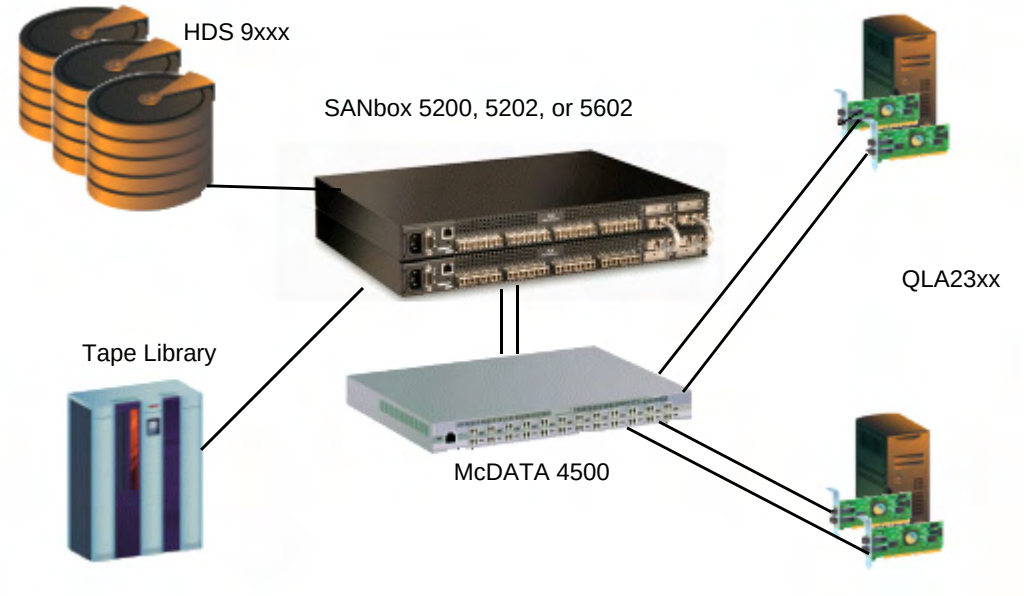
Cascade Configuration: SANbox 5602 and SANbox 5200



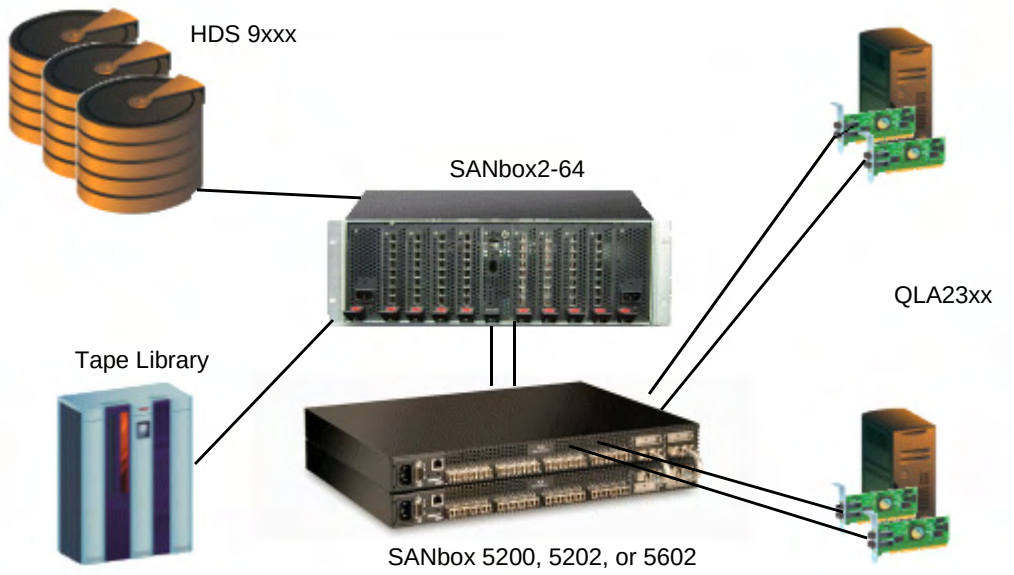
Cascade Configuration: SANbox 5000 Series and Brocade 3800



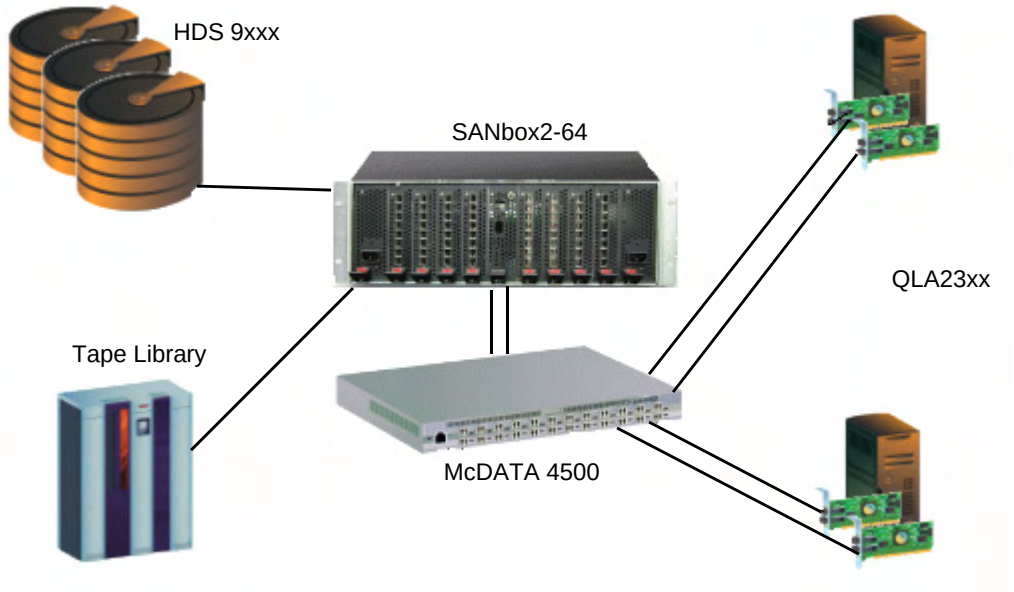
Cascade Configuration: SANbox 5000 Series and McDATA 4500



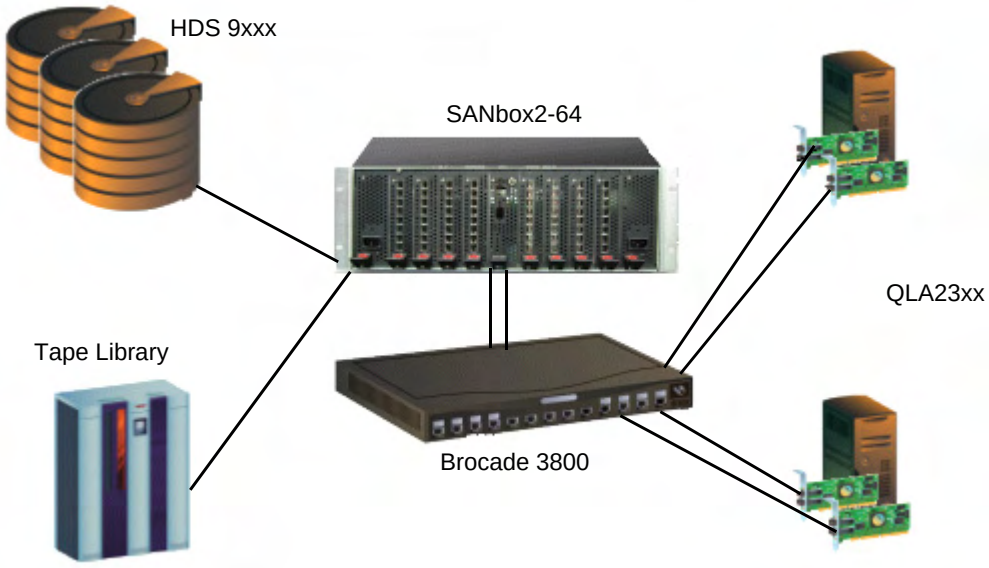
Cascade Configuration: SANbox 5000 Series and SANbox2-64



Cascade Configuration: SANbox2-64 and McDATA 4500



Cascade Configuration: SANbox2-64 and Brocade 3800



Driver and Firmware Levels

The following driver and firmware levels were used during QLogic certification testing. See the QLogic website for the latest drivers, software, and manuals: http://www.qlogic.com/support/drivers_software.asp.

NOTE: When visiting the website, be sure to choose the information specific to HDS / QLogic products, as support levels may be different from the latest QLogic released versions. For HDS storage, verify currently supported driver and firmware levels for SAN components by contacting HDS Technical Support.

QLogic SANblade HBAs

Model	Windows 2000	Windows 2003 (SCSI 32-bit)	Windows 2003 (STOR 32-bit)	Red Hat 3.0 (32-bit)	Solaris Driver	BIOS
QLA2310 QLA2340 QLA2342	9.0.1.12 or above 9.0.1.12 or above 9.0.1.12 or above	9.0.1.12 or above 9.0.1.12 or above 9.0.1.12 or above	9.0.1.17 or above 9.0.1.17 or above 9.0.1.17 or above	7.03.00 or above 7.03.00 or above 7.03.00 or above	4.06 or above 4.06 or above 4.06 or above	1.43 or above 1.43 or above 1.43 or above

Switches

Manufacturer	Model	Firmware	SANsurfer
QLogic QLogic QLogic QLogic	SANbox 5602 SANbox 5202 SANbox 5200 SANbox2-64	5.x or above 5.x or above 5.x or above 5.x or above	5.x or above 5.x or above 5.x or above 5.x or above
McDATA	See the *QLogic Switch Interoperability Guide* for information on supported McDATA switches.		
Brocade	See the *QLogic Switch Interoperability Guide* for information on supported Brocade switches.		

Hitachi Data Systems Storage

Model	Microcode
Lightning 9900 Series Thunder 9570 Lightning 9900 V Series	01-19-67-00/00 0659AZ 21-06-25-00/00

Application Software

Application	Vendor	Version
SANsurfer™ Management Suite CD	QLogic	4.x or above
Hitachi Resource Manager	HDS	4.0 or above
Disk Array Management Program 3	HDS	10.05 or above

Operating Systems

Operating System	Version	Service Pack/Patch
Microsoft Windows	2000 Server	SP3 or above
Microsoft Windows	2003 Server	none
Red Hat	Enterprise Linux 3.0	none
Sun Solaris	8 or above	8 or above

SAN Setup and Configuration

The following section of the *QLogic SAN Configuration Guide for HDS Storage* provides instructions to set up and configure your storage, servers, and storage network. Once you have completed these steps, additional procedures illustrate how to connect the host and storage ports to the networks and how to validate your storage network connections.

In most cases, the SAN setup and configuration proceeds in this order:

1. Server Configuration
2. Storage Configuration
3. Storage Network Configuration

Server Configuration

This section walks you through the steps needed to ready your server for connection to the storage network, including information on:

- Fibre Channel HBAs from QLogic
- Installing and configuring HBA drivers
- Installing the HBA and switch device management application (SANsurfer Management Suite)
- Configuring the HBA with appropriate settings

Once you have completed the steps in this section, you can continue to set up the storage network and connect the server to the fabric.

Fibre Channel HBAs Overview

The award-winning QLogic SANblade 2300 Series Fibre Channel HBAs offer 2Gb performance for demanding SANs and are available in PCI-X form factor, which is backwards compatible to PCI. QLogic SANblade HBAs are the industry's highest-performing and most widely deployed host adapter solutions for server, networking, storage and clustering solutions.

The SANblade 2300 Series architecture is the result of more than 15 years of progressive development and testing. The QLogic proven architecture delivers higher overall reliability and enables advanced functionality with its single chip integration, placing QLogic years ahead of its competitors. The SANblade 2300 also has proven interoperability with all major software applications, hardware platforms and operating systems.

The QLogic QLA23xx HBAs tested with the HDS storage systems are:

- QLA234x
- QLA2310

Assumptions

The following procedures assume that:

- You have installed the HBA device into the system according to specifications in the hardware installation guide provided with the HBA. For more information, see the SANblade user manual at: http://www.qlogic.com/support/home_resources.asp?id=76.
- Your operating system and appropriate patches have been installed to meet the software and driver requirements for all components. For information, see “Driver and Firmware Levels” on page 19.

To complete the server configuration, refer to these sections:

- Installing SANsurfer Management Suite
- Configuring the Server on Windows
- Configuring the Server on Solaris
- Configuring the Server on Red Hat

Installing SANsurfer Management Suite

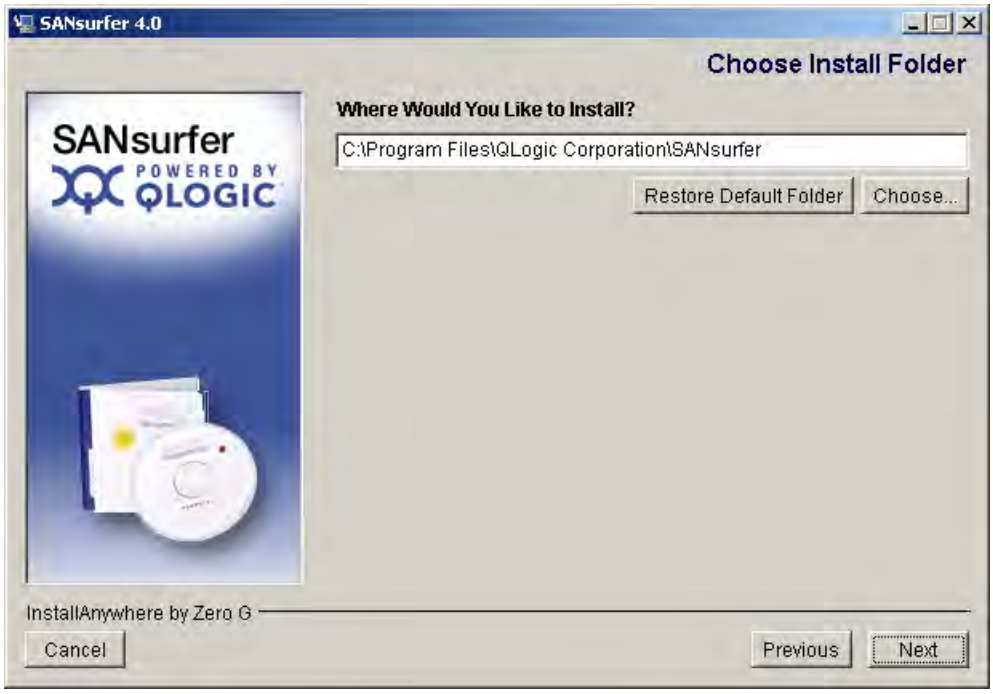
To install the SANsurfer Management Suite, follow these steps:

1. Download the latest version from the Download section of the QLogic website (http://www.qlogic.com/support/drivers_software.asp) and double click the icon to start the installation.
2. When the Introduction dialog displays, click **Next**.
3. Read the **Application Notes** carefully and click **Next** when you're ready:

4. Select **ALL GUIs and ALL Agents** and click **Next**.

5. Edit the path where you want to install the software or click **Choose** and browse to the location. Click **Next**:

b



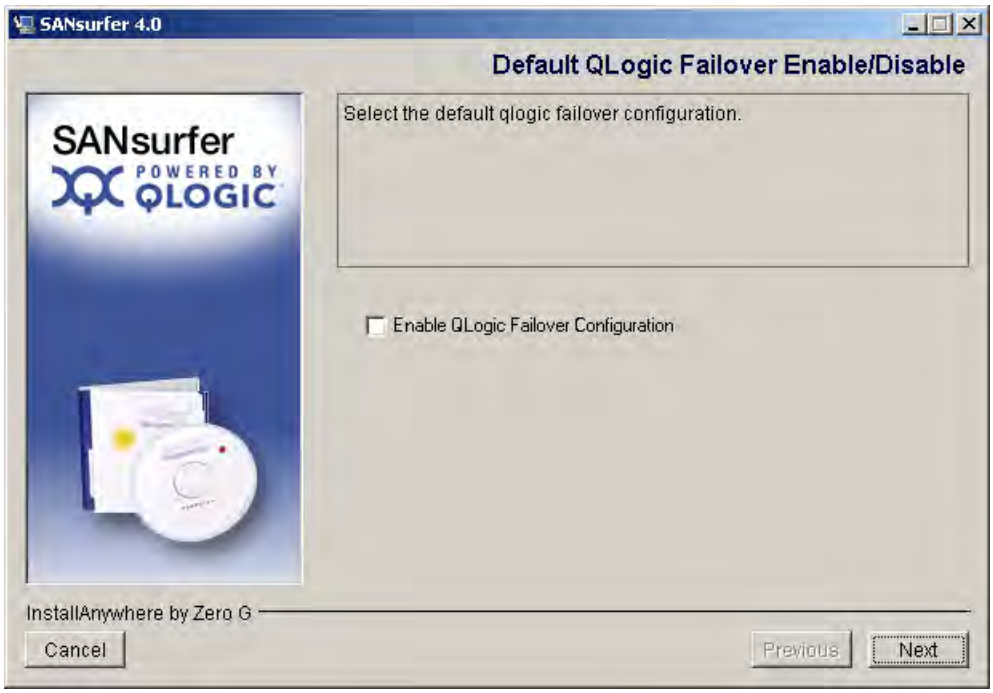
If you are installing on Red Hat, proceed to step 8.

6. On Windows only, select the **Shortcut Profile** you wish to use and click **Next**:

7. On Windows only, check **create desktop icon** if you wish, and click **Next**:

8. Review the Pre-Installation Summary and click **Install** when you're ready:

9. When the Default QLogic Failover Enable/Disable dialog box displays, click **Next**.



NOTE: This feature may be enabled through SANsurfer at a later date.

10. Click **Done** when the installation process completes.

Configuring the Server on Windows

The following sections illustrate how to perform the server configuration tasks on Windows:

- Installing the Windows Driver
- Configuring the HBA on Windows

Installing the Windows Driver

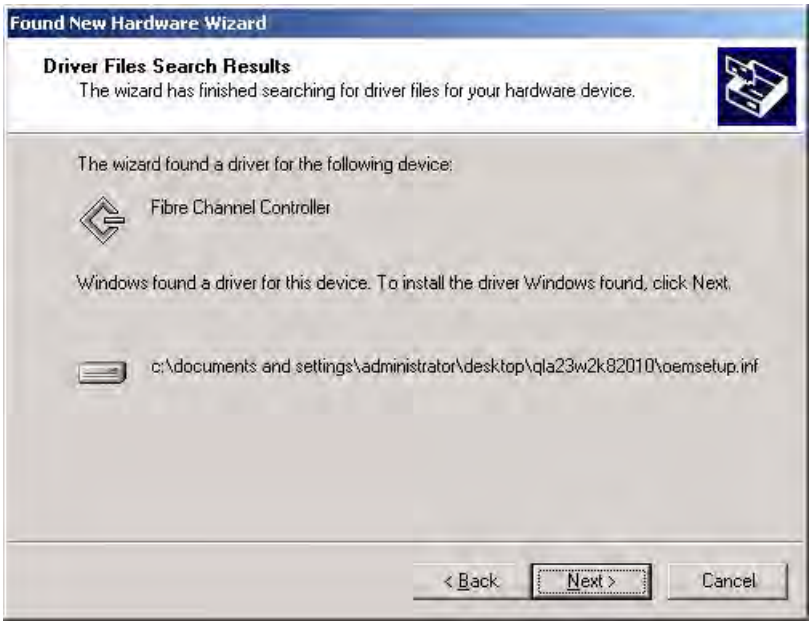
The QLA23*xx* HBAs are plug-and-play devices automatically detected by Windows.

1. Download the latest driver from the **Download** section of the QLogic website (http://www.qlogic.com/support/drivers_software.asp) and extract them.
2. Windows detects the newly installed device, then displays the Found New Hardware Wizard message. Click **Next** to begin the driver installation.
3. When prompted, select **Search for a suitable driver for my device (recommended)** and click **Next**.

4. Check **Specify a location** and click **Next:**

5. Browse to the directory containing the driver and click **OK**:

6. When the **Driver Files Search Results** display, click **Next**:



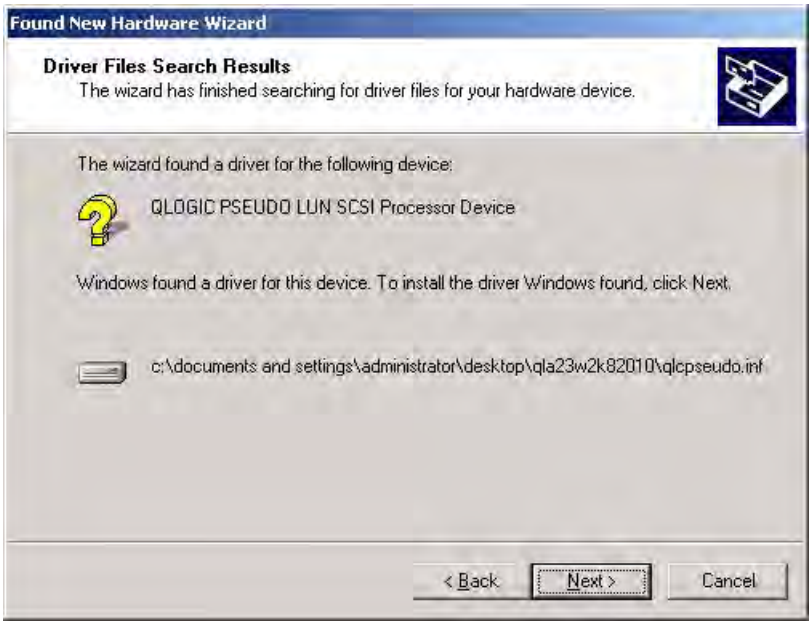
7. Click **Finish** to complete the installation.

Windows 2000 HBA Pseudo LUN Driver

For Windows 2000 only, you must also install the pseudo LUN driver. Windows 2000 detects the newly installed device automatically.

1. Click **Next** to begin the driver installation from the Found New Hardware Wizard message.
2. When prompted, select **Search for a suitable driver for my device (recommended)** and click **Next**.
3. Check **Specify a location** and click **Next.**
4. Browse to the directory containing the driver and click **OK**.

5. When the **Driver Files Search Results** display, click **Next**:

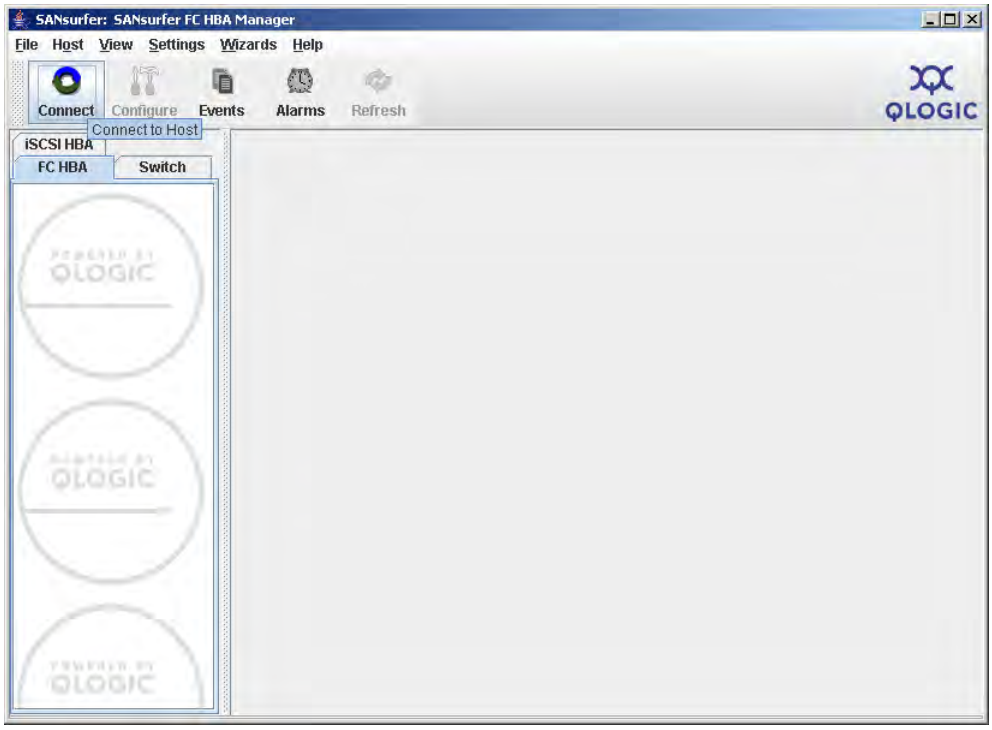


6. Click **Finish** to complete the installation.

Configuring the HBA on Windows

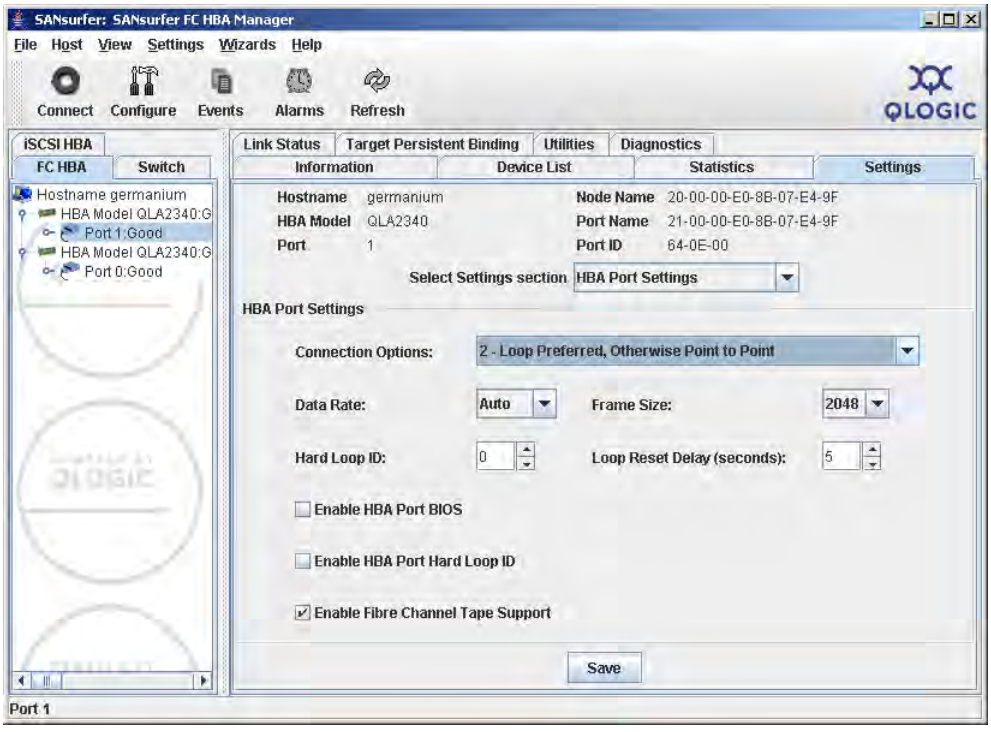
To configure the QLogic HBA on Windows, follow these steps:

1. Launch SANsurfer.
2. From the SANsurfer FC HBA Manager, click **Connect** on the toolbar:



3. From the **Connect to Host** dialog, select the host from the list and click **Connect**:

4. From the SANsurfer FC HBA Manager window:
   a. Select the port to configure from the FC HBA list on the left.
   b. Click the **Settings** tab on the right.
   c. Select the desired port settings.
   d. Click **Save**.



5. Enter the **Password** in the Security Check dialog box:

NOTE: The default password is "config". Contact your System Administrator if the password was changed.

6. Click **OK** to close the NVRAM Save confirmation message.

Configuring the Server on Solaris

The following sections describe how to configure the server on Red Hat:

- Installing the Solaris HBA Driver
- Configuring the HBA on Solaris

Installing the Solaris HBA Driver

1. Install the QLA23*xx* HBA.
2. Power up the computer.
3. Download the latest driver from the HDS-specific page in the **Download** section of the QLogic website (http://www.qlogic.com/support/drivers_software.asp) and uncompress the file using the **uncompress** command.
4. Follow the example below to install the driver:

```
sodium:/qlogic-> uncompress qla2300_pkg_v406.Z
sodium:/qlogic->pkgadd -d ./qla2300_pkg_v406

The following packages are available:
  1  QLA2300-1     QLogic QLA2300 driver
                   (sparc) Solaris 2.6, Rev=4.06
  2  QLA2300-2     QLogic QLA2300 driver
                   (sparc) Solaris 7, Rev=4.06
  3  QLA2300-3     QLogic QLA2300 driver
                   (sparc) Solaris 8-9, Rev=4.06
  4  QLSDMLIB      QLogic SDM Library
                   (sparc) Solaris 7-8-9, Rev=2.02
  5  QLSDMLIB6     QLogic SDM Library
                   (sparc) Solaris 2.6, Rev=2.02
  6  scfx2-6       QLogic SANblade Control FX (HBA Configuration Utility)
                   (sparc) Solaris 2.6, 7 Rev=1.18
  7  scfx2-8       QLogic SANblade Control FX (HBA Configuration Utility)
                   (sparc) Solaris 8-9 Rev=1.18

Select package(s) you wish to process (or 'all' to process
all packages). (default: all) [?,??,q]: 3 (choose the correct driver for your OS
version.)

Processing package instance <QLA2300-3> from </qlogic/qla2300_pkg_v406>

QLogic QLA2300 driver
(sparc) Solaris 8-9, Rev=4.06

Copyright (c) 1996-2002, by QLogic Corporation. All rights reserved.


Where do you want the driver object installed (default=/kernel/drv): <Hit Enter>
## Executing checkinstall script.
Using </> as the package base directory.
```

```
## Processing package information.
## Processing system information.
## Verifying disk space requirements.
## Checking for conflicts with packages already installed.
## Checking for setuid/setgid programs.

This package contains scripts which will be executed with super-user
permission during the process of installing this package.

Do you want to continue with the installation of <QLA2300-3> [y,n,?] y

Installing QLogic QLA2300 driver as <QLA2300-3>
## Installing part 1 of 1.
/kernel/drv/qla2300
/kernel/drv/qla2300.conf
/kernel/drv/sparcv9/qla2300
[ verifying class <none> ]
## Executing postinstall script.
Reboot client to install driver.

Installation of <QLA2300-3> was successful.
```

Configuring the HBA on Solaris

To configure the HBA on Solaris, the same steps described for Windows in the section, “Configuring the HBA on Windows” (page 34).

Configuring the Server on Red Hat

The following sections describe how to configure the server on Red Hat:

- Installing the Red Hat Driver
- Configuring the HBA on Red Hat

Installing the Red Hat Driver

To install the Red Hat driver, follow these steps:

1. Download the latest driver from the **Download** section of the QLogic website (http://www.qlogic.com/support/drivers_software.asp) and extract them.
2. Verify that you have the kernel source package installed:

   ```
   [root@localhost qlogic]# rpm -qa |grep kernel-source
   ```

3. Uncompress and extract the distribution file:

   ```
   [root@localhost qlogic]# tar zxvf qla2x00-v7.03.00-dist.tgz
   ```

4. Change to the directory where you extracted the distribution file:

   ```
   [root@localhost qlogic]# cd qlogic
   ```

5. Execute the "drvrinstall" script to extract the driver:

   ```
   [root@localhost qlogic]# ./drvrinstall
   ```

6. Compile the driver and copy it to the correct system location:

   ```
   [root@localhost qlogic]# make qla2300.o install
   ```

   and add "SMP=1" for multiple processor systems. For example:

   ```
   [root@localhost qlogic]# make qla2300.o install SMP=1
   ```

7. Load the driver by hand:

   ```
   [root@localhost scsi]# modprobe qla2300
   ```

New RAMDISK for the Red Hat Driver

If you are using Red Hat, follow these steps to create a new RAMDISK and load the driver by default.

1. Edit **/etc/modules.conf** and add the following entries:

   ```
   alias scsi_hostadapter# qla2300_conf
   alias scsi_hostadapter# qla2300
   ```

   where "#" is a unique number. For example:

   ```
   alias scsi_hostadapter0 qla2300_conf
   alias scsi_hostadapter1 qla2300
   ```

2. Change to the /boot directory:

   ```
   [root@localhost etc]# cd /boot
   ```

3. Create a new RAMDISK

   ```
   [root@localhost boot]# mkinitrd -f 2.4.21-15smp_qlogic 2.4.21-15.ELsmp
   ```

   where **mkinitrd -f <image name> <kernel version>** is the actual image name and kernel version you are using. Be sure the image name is unique or you may overwrite an existing file.

   NOTE: If you did not run this command in the /boot directory, copy your new image to the /boot directory.

4. Create a new entry in the bootloader to load the new RAMDISK. (We assume GRUB as it is the default for Red Hat). For example:

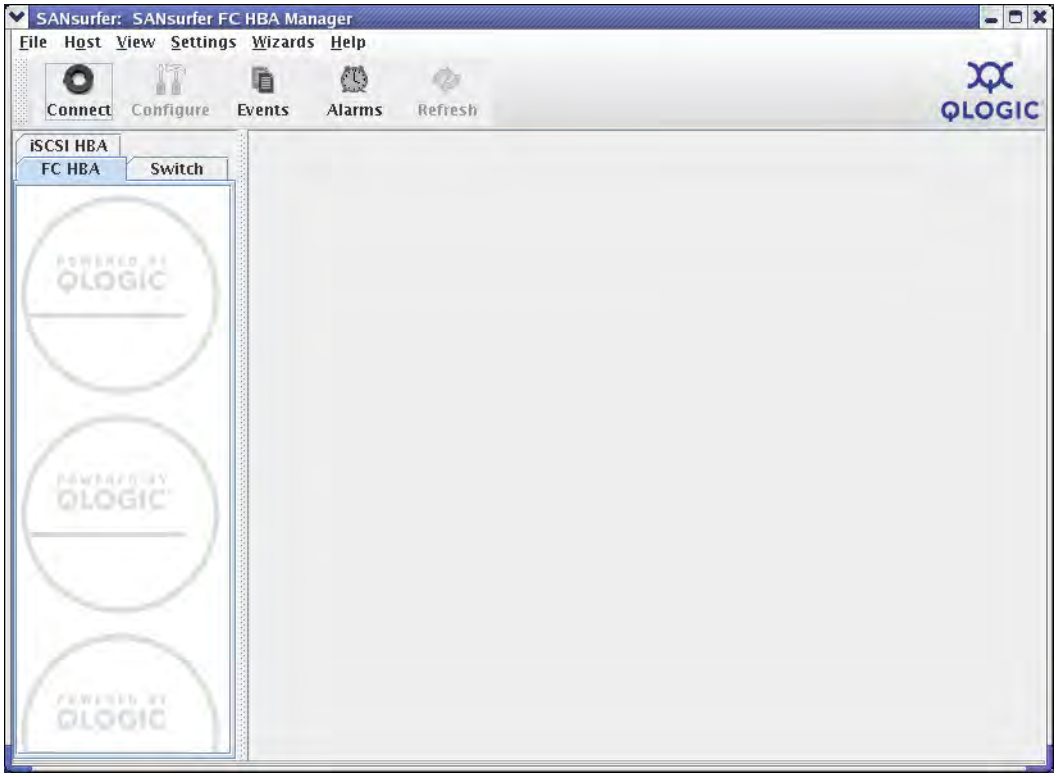
   ```
   title Red Hat Enterprise Linux ES (2.4.21-15.ELsmp) - QLogic Driver
   root (hd1,0)
   kernel /boot/vmlinuz-2.4.21-15.ELsmp ro root=LABEL=/
   initrd /boot/2.4.21-15smp_qlogic
   ```

5. Reboot the server and select the new RAMDISK.

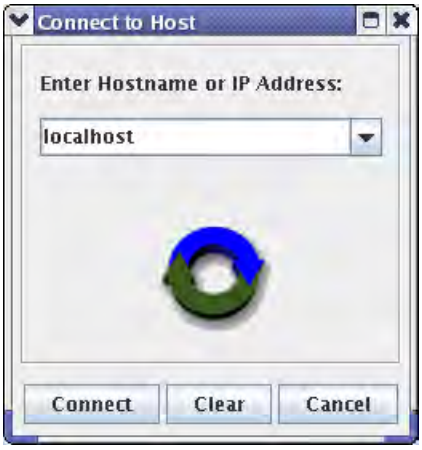
Configuring the HBA on Red Hat

On Red Hat, follow these steps to configure the QLogic HBA:

1. Launch SANsurfer.
2. From the SANsurfer FC HBA Manager tab, click **Connect**:



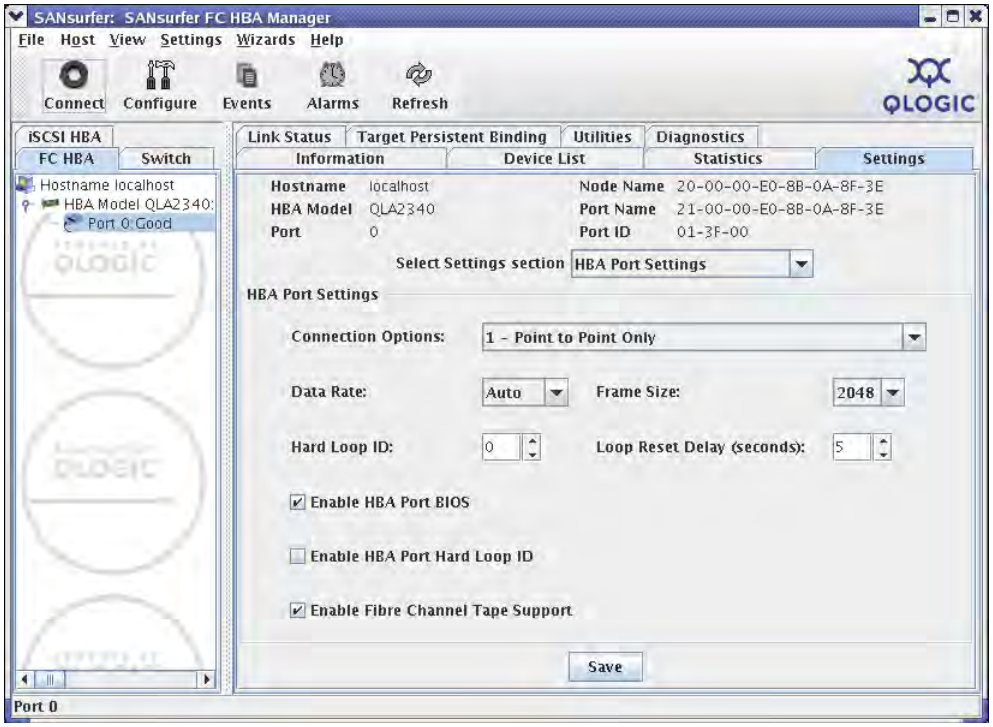
3. From the Connect to Host dialog, select the host from the list and click **Connect**.



4. From the **SANsurfer FC HBA Manager** window:
   a. Select the desired port from the tree in the left hand frame.
   b. Click the **Settings** tab.
   c. From the **Connection Options** list, select the connection type to use.

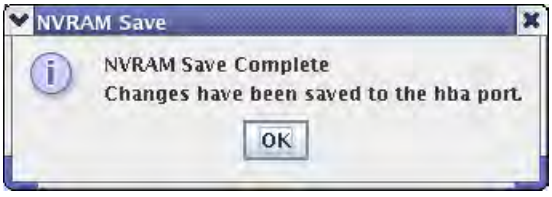
d. Select a **Data Rate** from the list.

e. Click **Save**.



5. Enter the password in the **Security Check** dialog box.

6. Click **OK** to the **NVRAM Save** confirmation message.



Storage Configuration

This section outlines configuration procedures for the following HDS platforms:

- Thunder 9500
- Lightning 9900 Series
- Lightning 9900V Series

For each of the HDS storage platforms, you will find step-by-step procedures for the following tasks:

- Storage port configuration
- Volume/LUN creation
- Volume/LUN assignment
- LUN security

Completing these steps will prepare the allocated storage for connection to the fabric.

HDS Storage Overview

Hitachi Data Systems is known for its information storage solutions and its alliances with industry-leading vendors to provide for data center, systems integration, e-commerce, and enterprise process renewal needs. For more information on HDS storage systems, refer to the HDS website at http://www.hds.com/products_services/san/.

Assumptions

The following procedures assume that:

- You have allocated storage space of suitable size for the application being used.
- You have created and defined a RAID group within the storage.
- Your storage system has an available port.

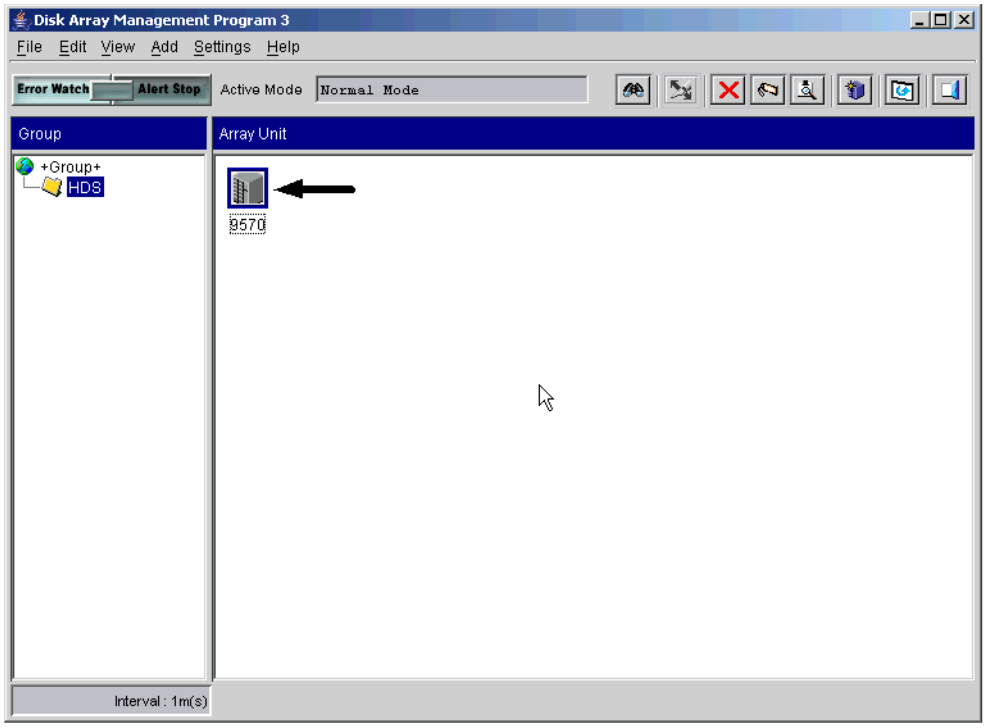
Thunder 9500

The Hitachi Freedom Storage™ Thunder 9500™ provides fast, reliable storage with scalability and performance. Use the following procedures to configure the 9500 for use with QLogic SAN components:

- Creating a LUN
- Assigning a LUN to a Port
- Configuring the Port Type

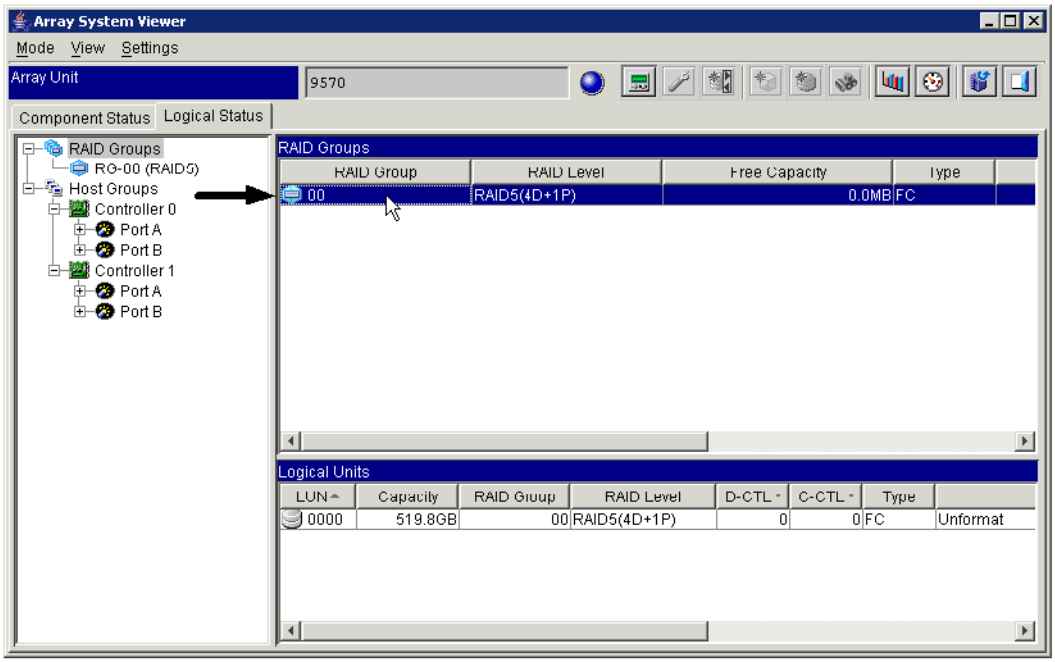
Creating a LUN

1. Launch the Hitachi Resource Manager application.
2. Select the array you want to work with and choose **Change Mode** from the **File** menu.
3. Enter the password to enter management mode and click **OK**.
4. Launch the **Array System Viewer** by double clicking on the array icon:

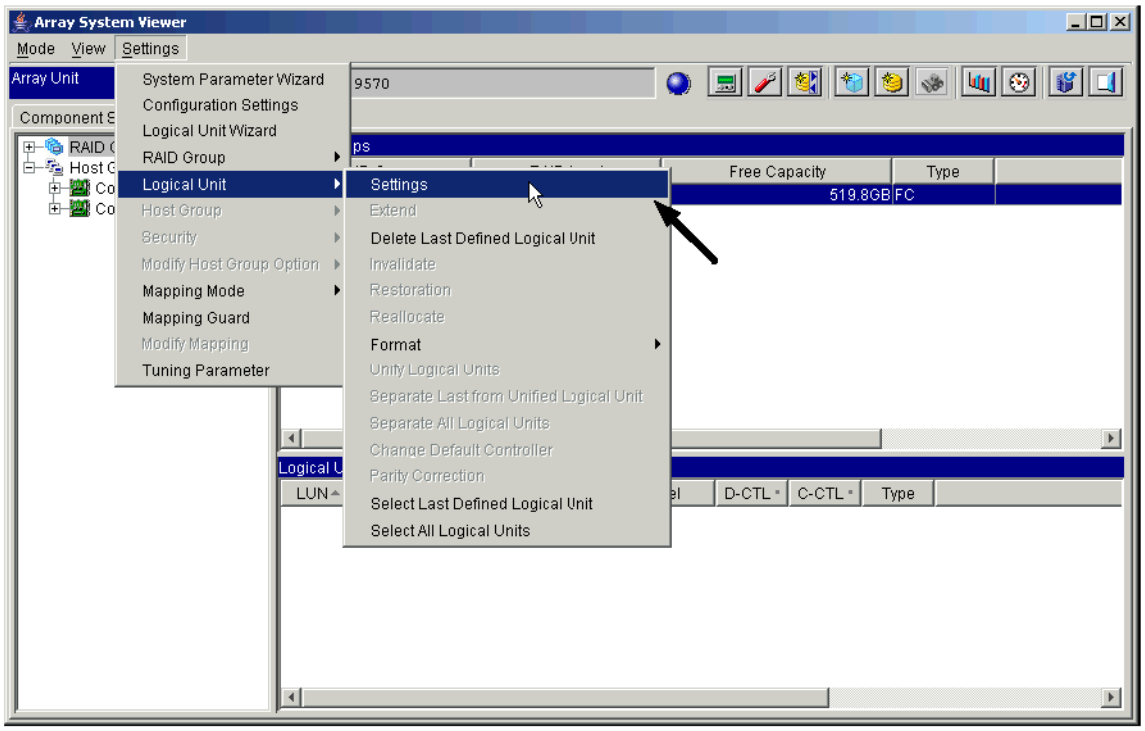


5. Click the **Logical Status** tab from the **Array System Viewer** dialog.

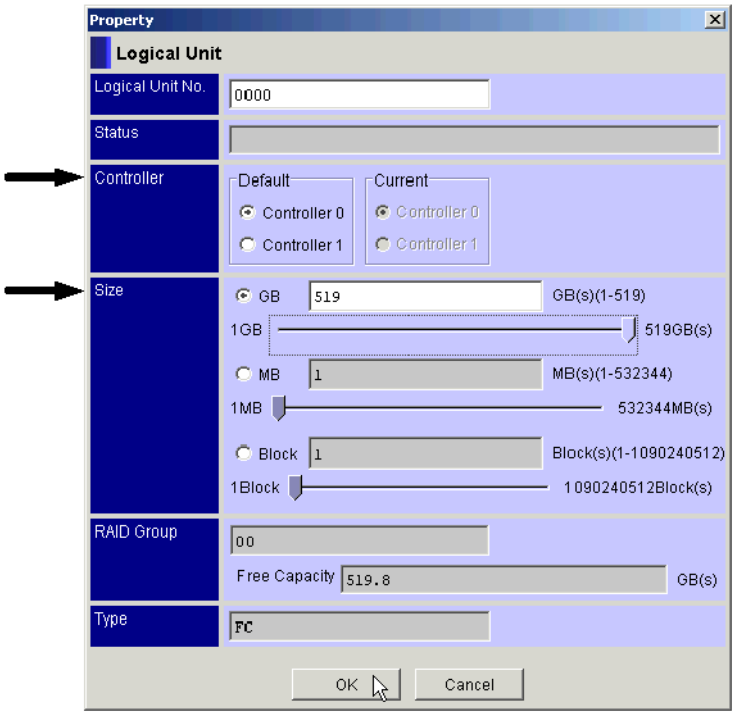
6. Select the RAID Group you wish to use from the **RAID Group** section:



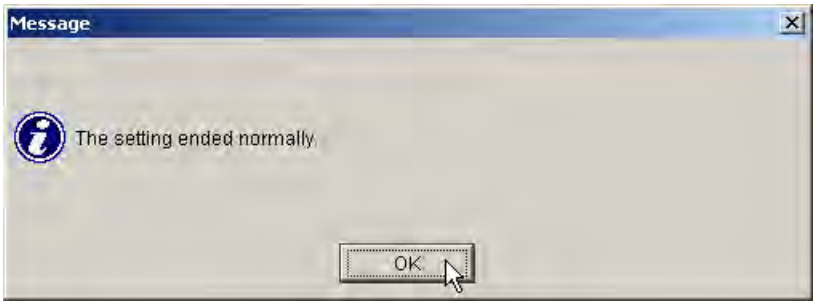
7. From the **Settings** menu, choose **Logical Unit**-**Settings**:



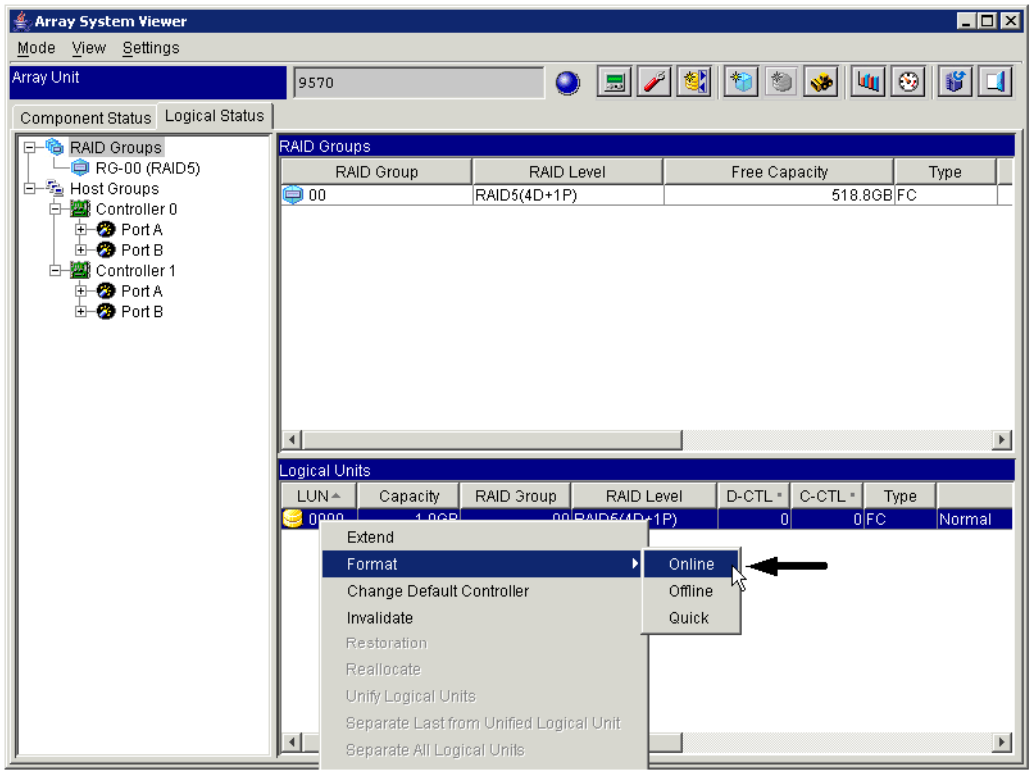
8. In the Logical Unit Property dialog, select a default **Controller** and change the logical unit **Size** as needed:



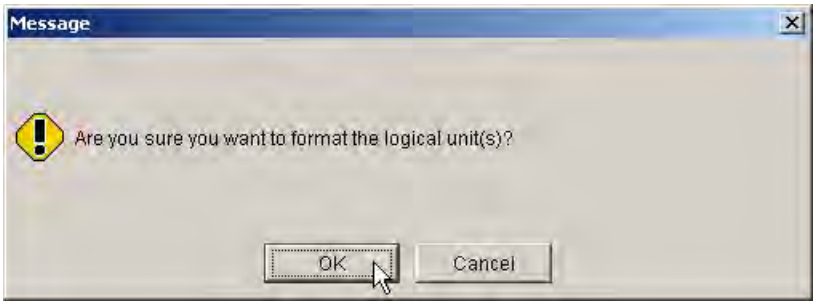
9. Click **OK** to the close the Message box:



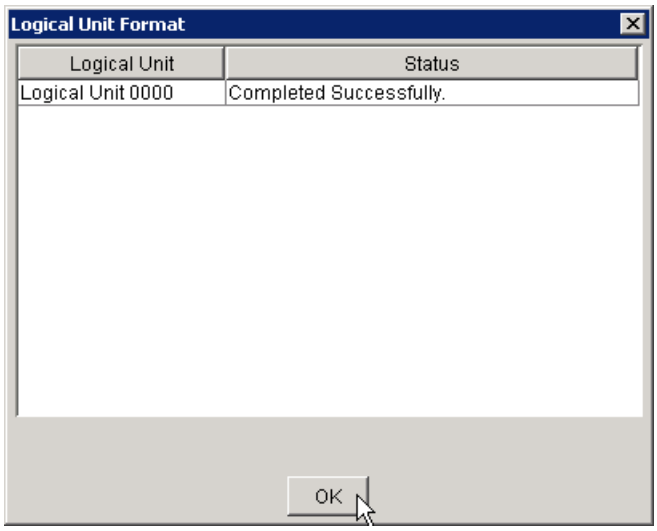
10. Right-click on the new LUN. Select **Format, Online**:



11. Click **OK** to format the logical unit:



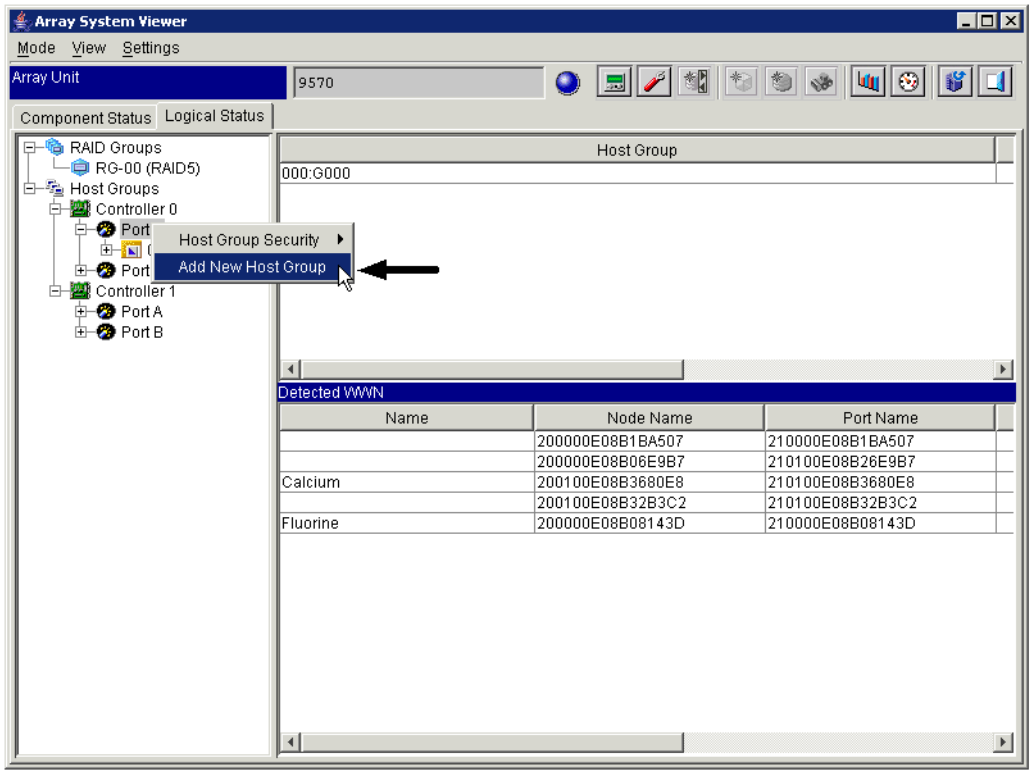
12. Click **OK** to close the status message:



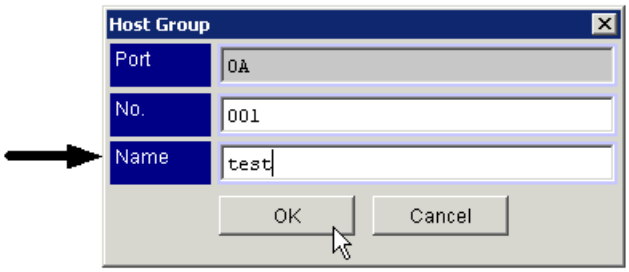
Assigning a LUN to a Port

1. Launch the Hitachi Resource Manager application.
2. Change from **Normal Mode** to **Management Mode** by selecting the array you wish work with and selecting **Change Mode** from the **File** menu.
3. Enter the password to enter management mode and click **OK**.
4. Launch the **Array System Viewer** by double clicking on the array icon.

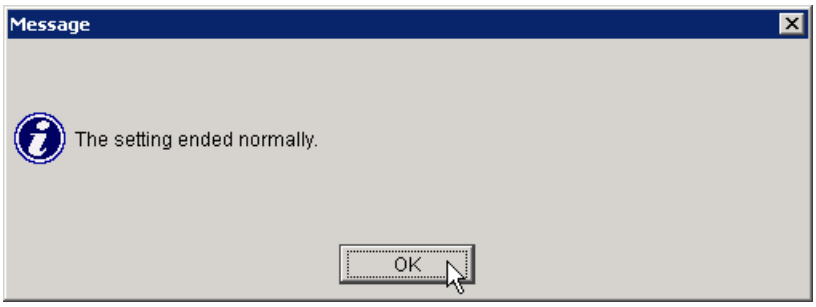
5. Right-click on the desired port and select **Add New Host Group**.



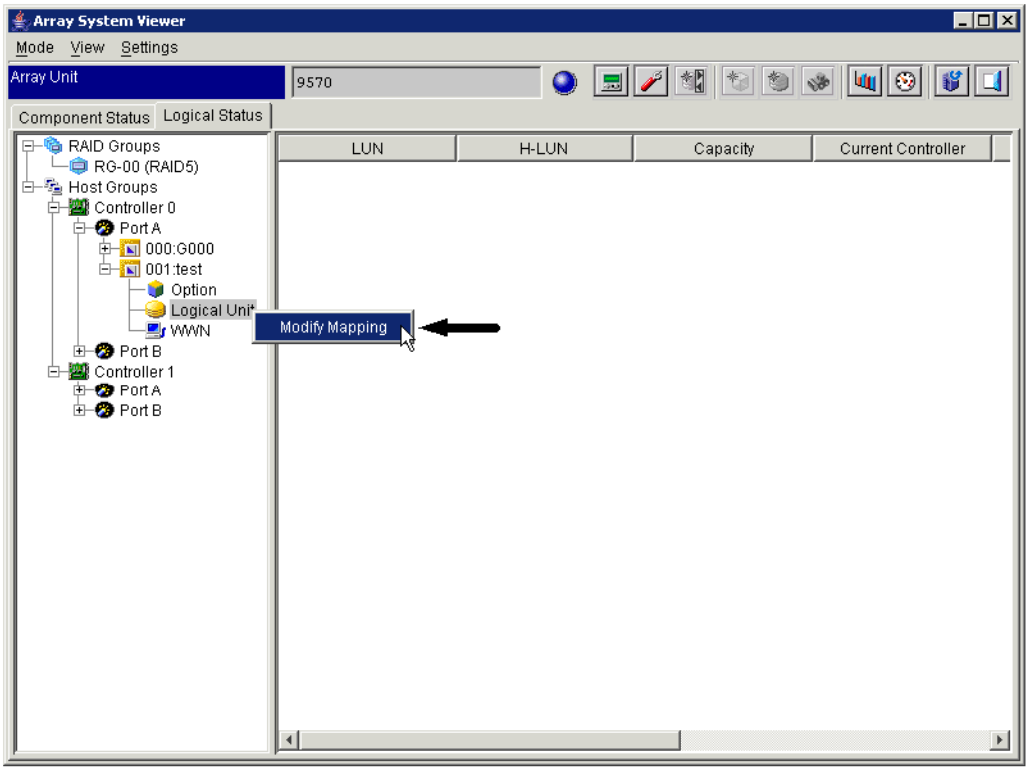
6. Enter **Host Group Name**, and click **OK**:



7. When the following confirmation message displays, click **OK**:



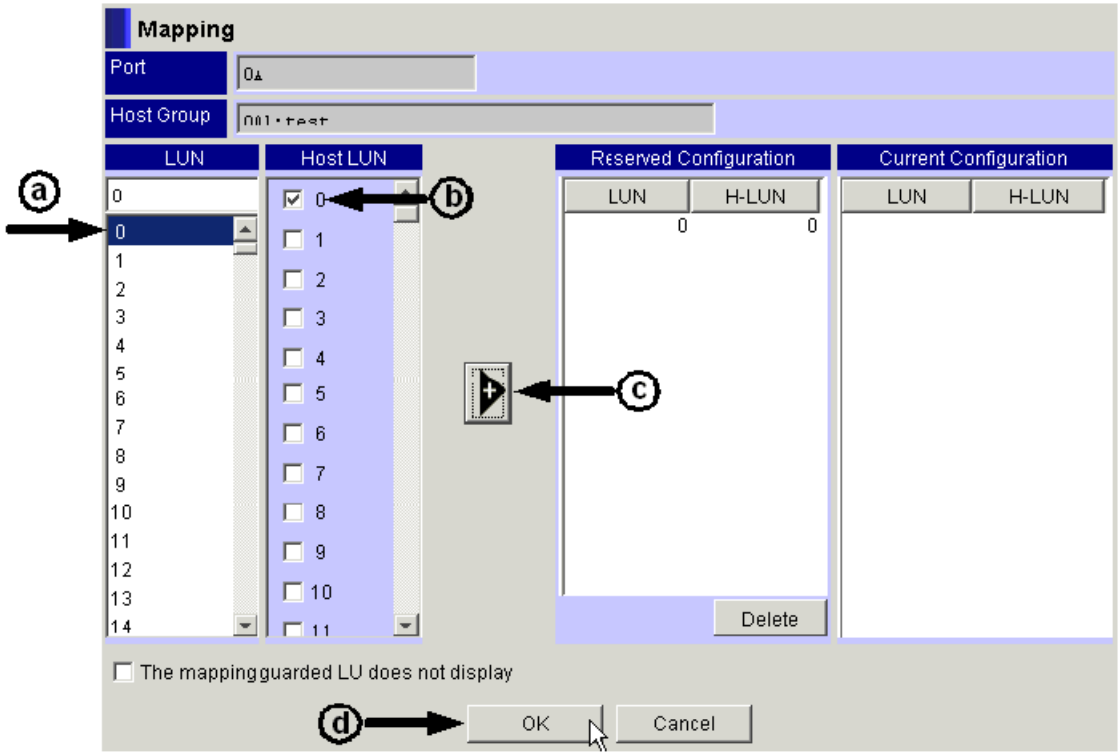
8. Expand the newly created Host Group under the port, right-click on **Logical Unit**, and select **Modify Mapping**:



9. Map the LUN as follows:
   a. Select the newly created **LUN** number under the LUN column on the left.
   b. Select the desired **Host LUN** number from the column on the right.

c. Click the **+** arrow button to transfer the mapping to the Reserved Configuration column.

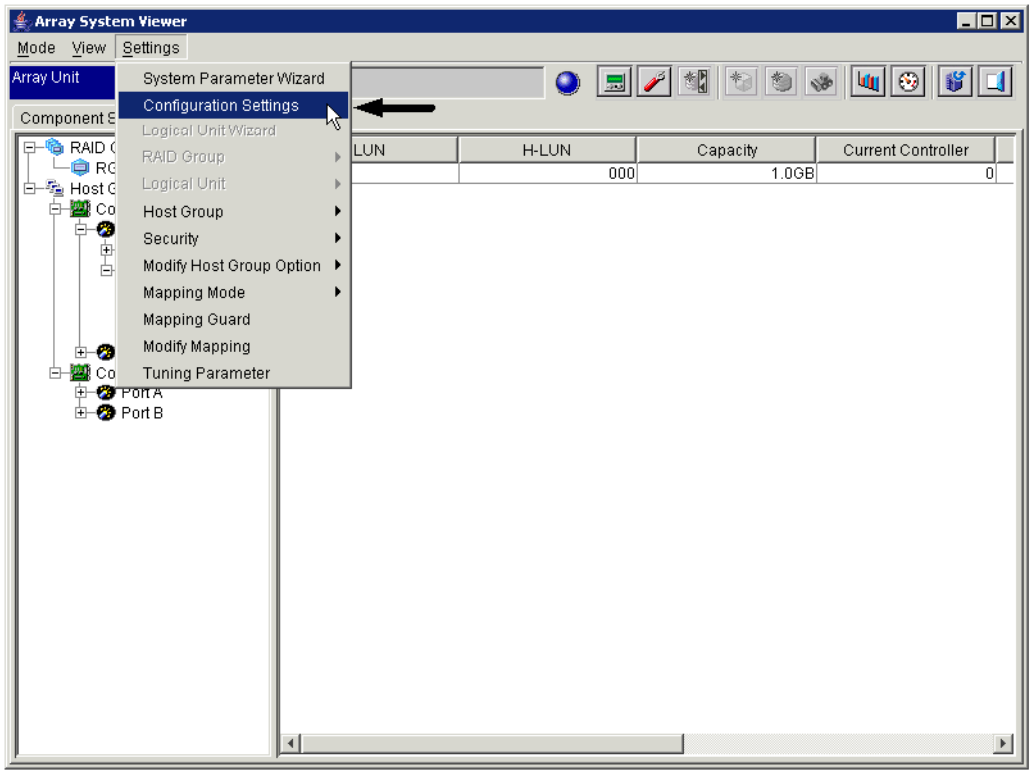
d. Click **OK**.



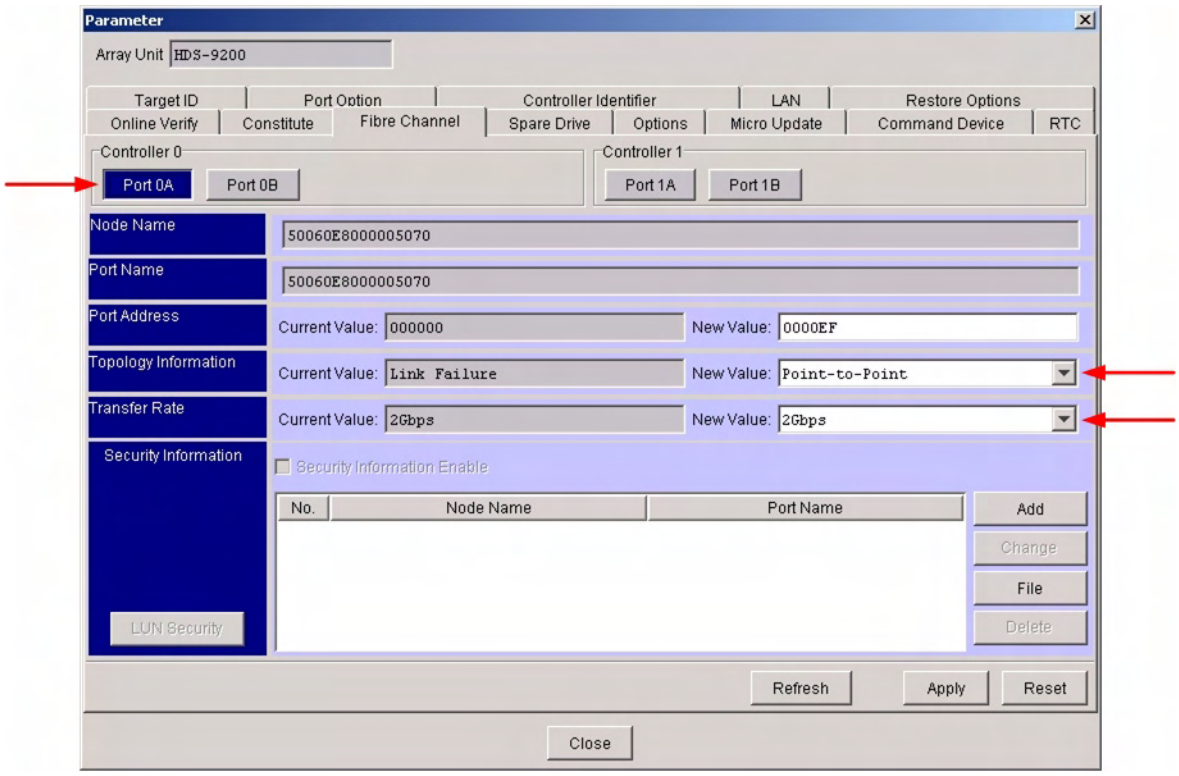
Configuring the Port Type

1. Launch the Hitachi Resource Manager application.
2. Change from **Normal Mode** to **Management Mode** by selecting the array you wish work with and selecting **Change Mode** from the **File** menu.
3. Enter the password to enter management mode and click **OK**.

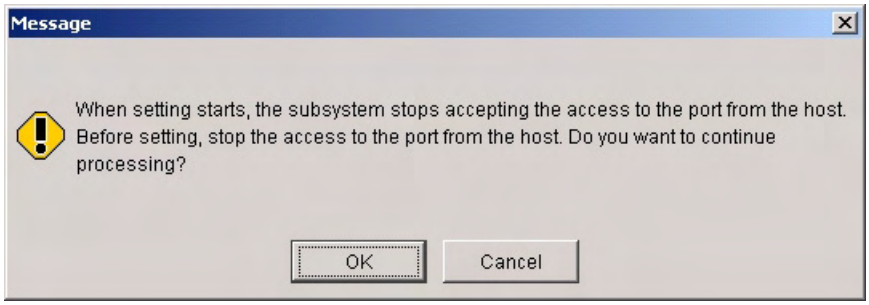
4. Launch the **Array System Viewer** by double clicking on the array icon. From the **Settings** menu, select **Configuration Settings**:



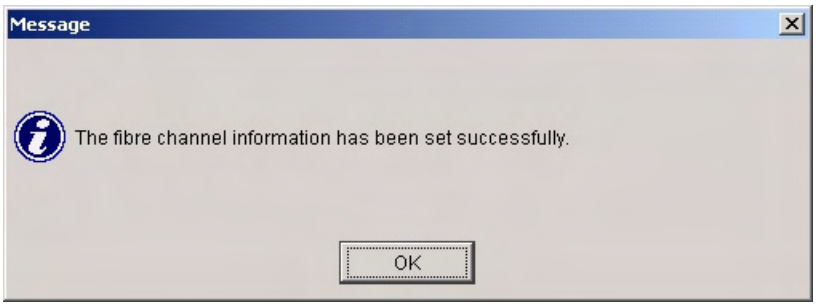
5. From the Parameter dialog, click the **Fibre Channel** tab and:
   a. Select the **Port** you want to configure.
   b. Select the **Topology Information** and **Data Rate** from the lists.
   c. Click **Apply**.



6. Click **OK** to close the warning message:



7. Click **OK** to close the Fibre Channel status message:



Lightning 9900 Series

Hitachi's Freedom Storage™ Lightning 9900™ Series offers advanced enterprise storage systems.

Assumptions for the 9900 Series Configuration

In addition to the assumptions listed on page 45, the following procedures to configure the 9900 series assume that:

- The Fibre Channel port on the HDS system is connected to the same fabric as your host systems.
- If zoning is implemented on your fabric, the port you are configuring is within the same zone as your host systems.

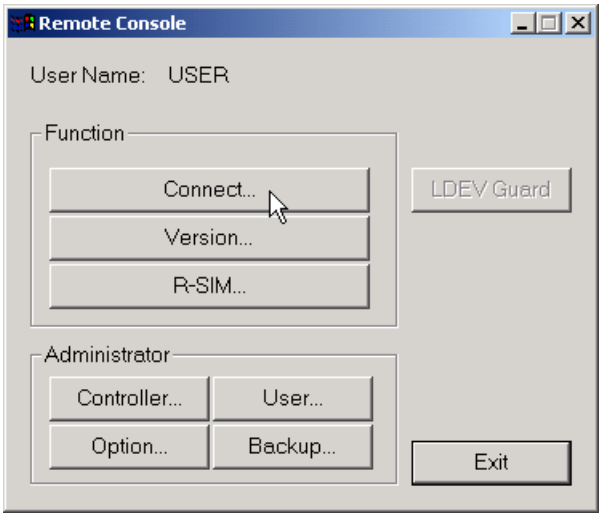
To set up the 9900 series, complete the following procedures:

- Connecting to the Unit
- Configuring the Host Type
- Configuring the Port Type
- Expanding a Volume
- Assigning a Volume to a Port
- Configuring Security

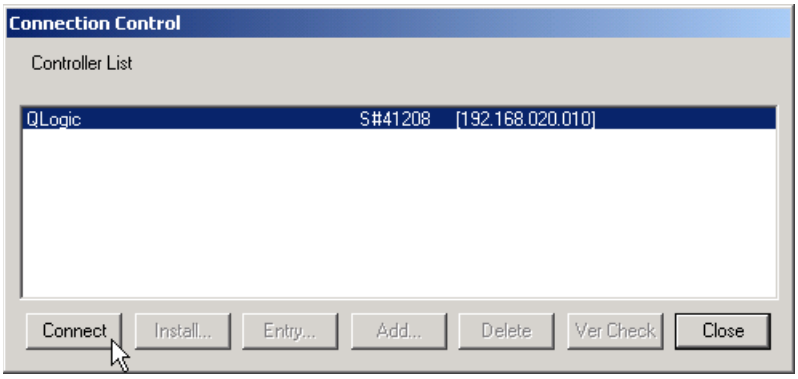
Connecting to the Unit

1. Log in to the Remote Console with a valid user name and password:

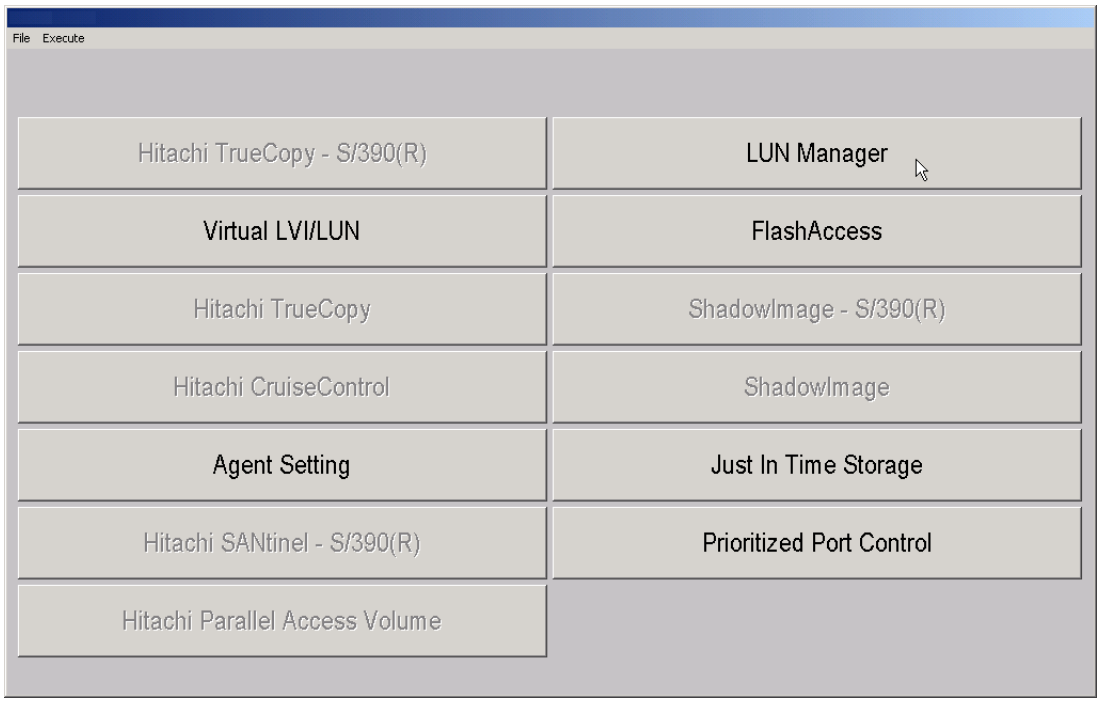
2. From the Remote Console window, click **Connect**:



3. From the Connection Control window, select the desired controller and click **Connect**:

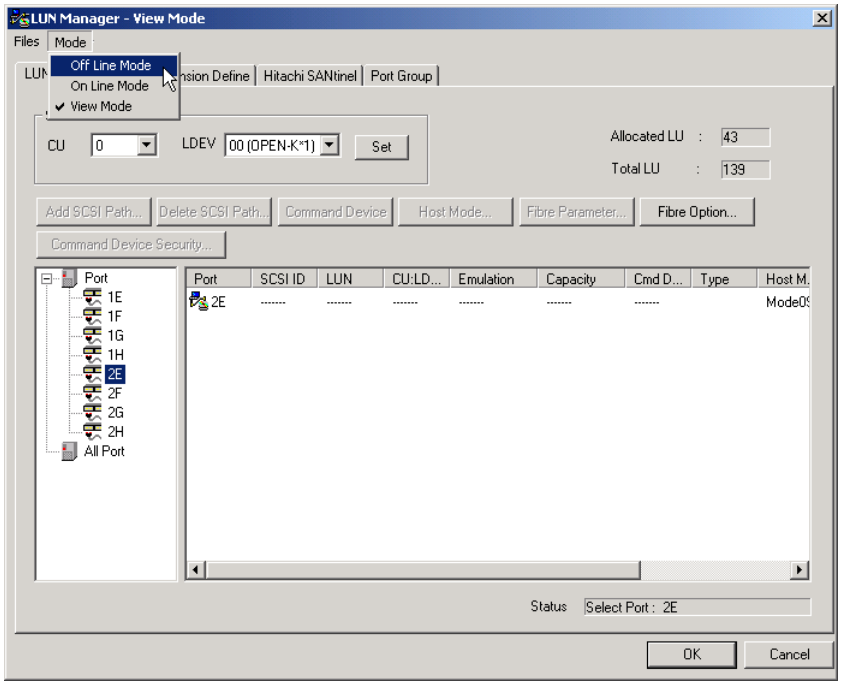


4. After the Hitachi Resource Manager appears click **LUN Manager** (it may take a few moments to load):



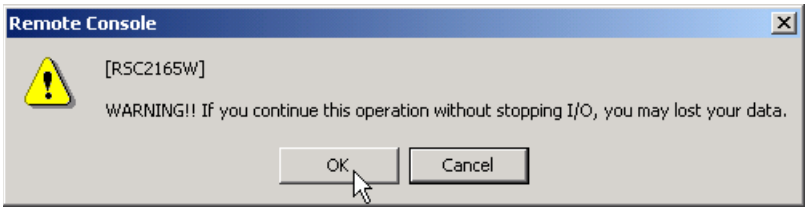
Configuring the Host Type

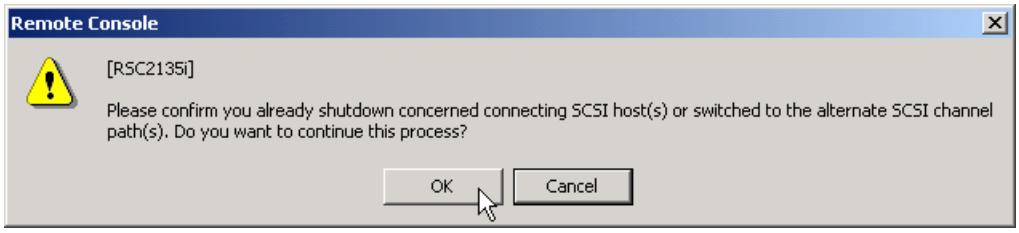
1. From the File menu, select **Off Line Mode**:



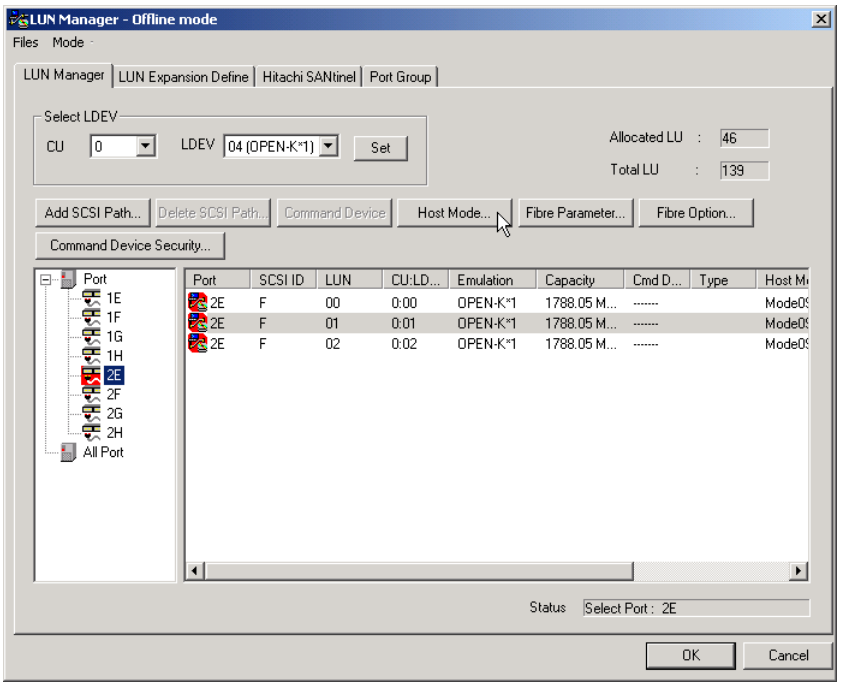
NOTE: Be sure you are not running any I/O to the port you are setting offline.

2. The Remote Console displays two warning messages. Click **OK** to acknowledge each one:

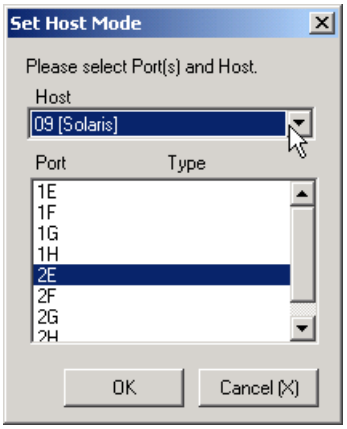




3. From the LUN Manager window, select the desired port and click **Host Mode** to assign the host type:

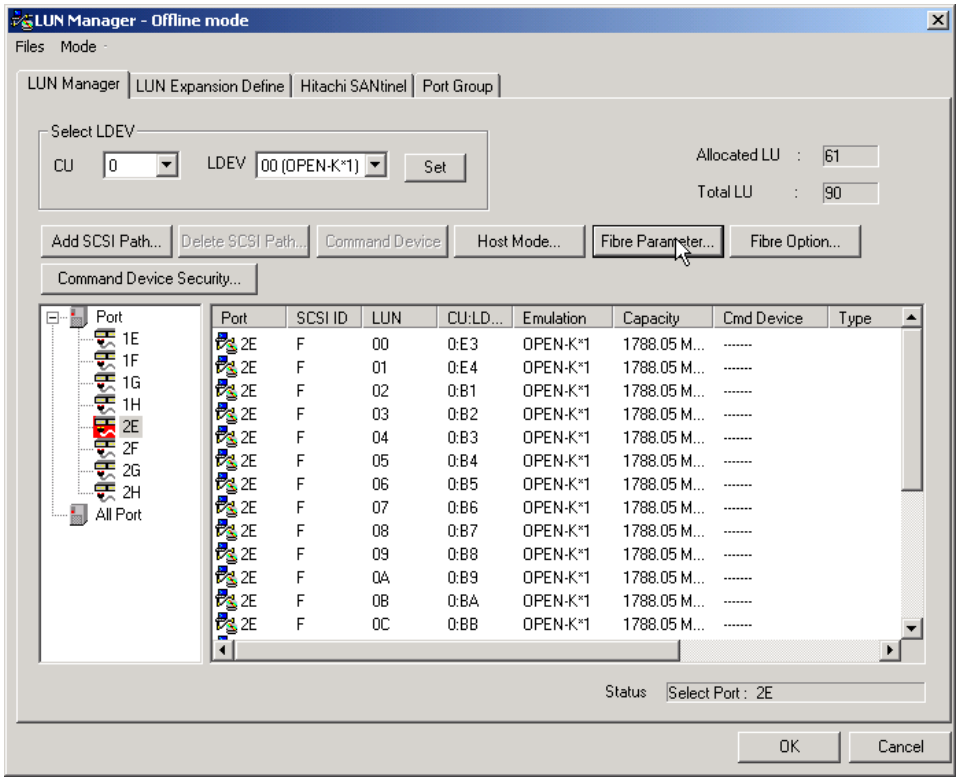


4. From the **Set Host Mode** window:
   a. Click the **Host** list
   b. Select the host type (for example, Solaris or Windows 2000).
   c. Click **OK**.

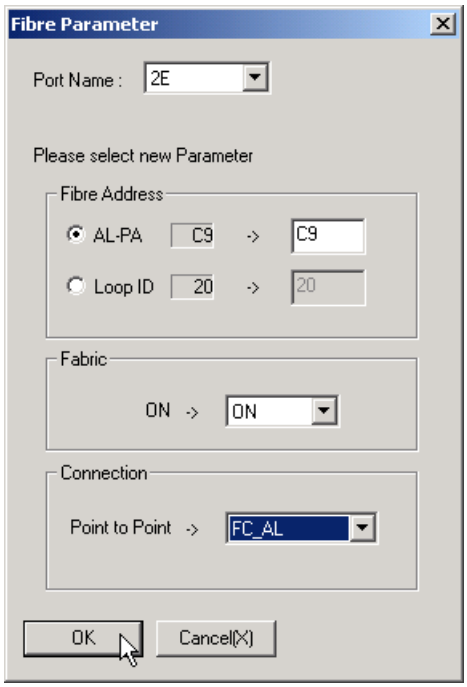


Configuring the Port Type

1. From the LUN Manager tab:
   a. From the Port list, select the **Port** you want to configure.
   b. Click the **Fibre Parameter** button:



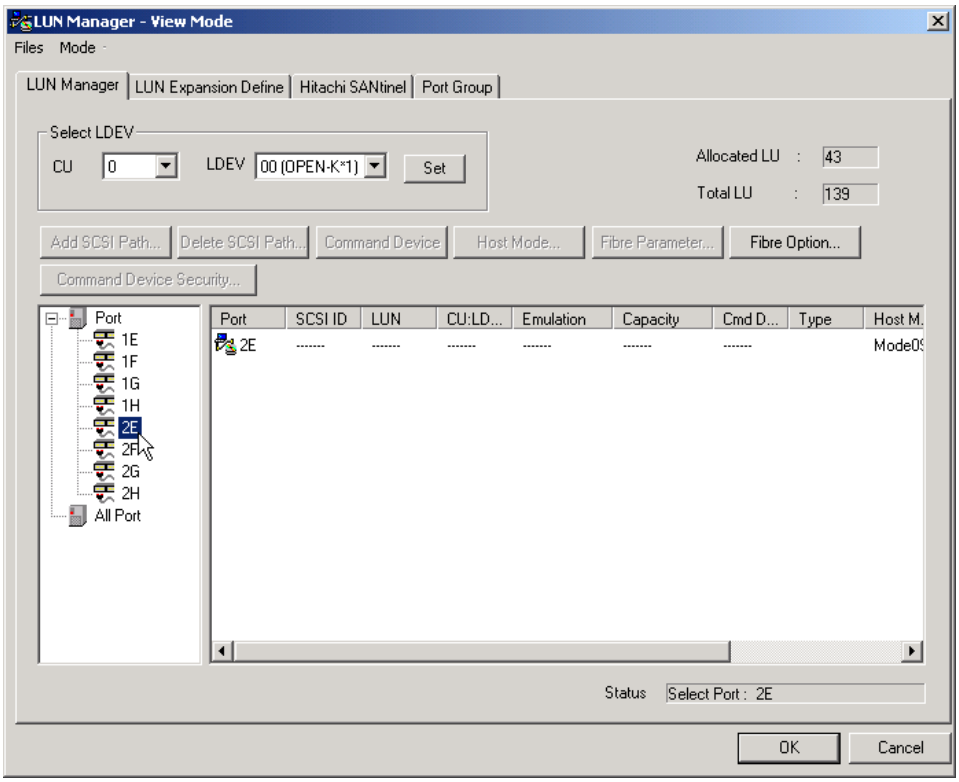
2. Modify the port settings as needed in the Fibre Parameter dialog:



3. Click **OK**.

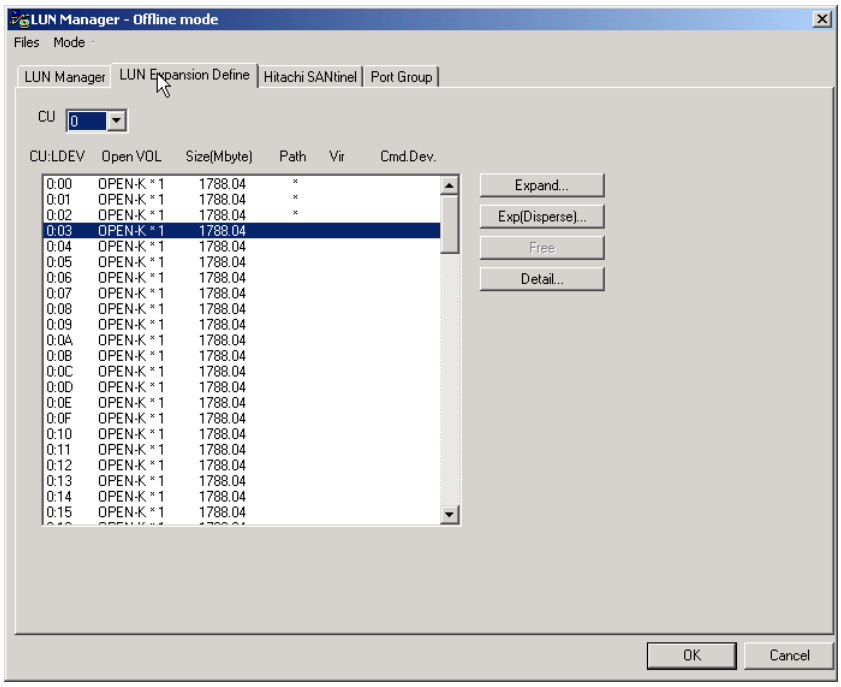
Expanding a Volume

1. From the LUN Manager tab, select the **Port** you want to configure:

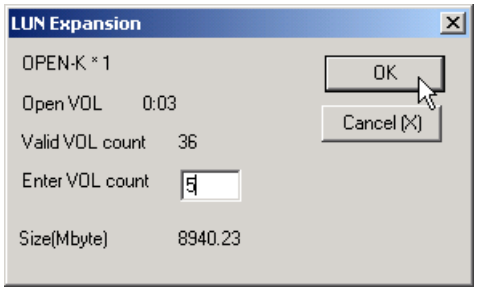


2. From the LUN Manager:
   a. Click the **LUN Expansion Define** tab.
   b. From the list, select the LDEV you want to create.

c. Click **Expand**.

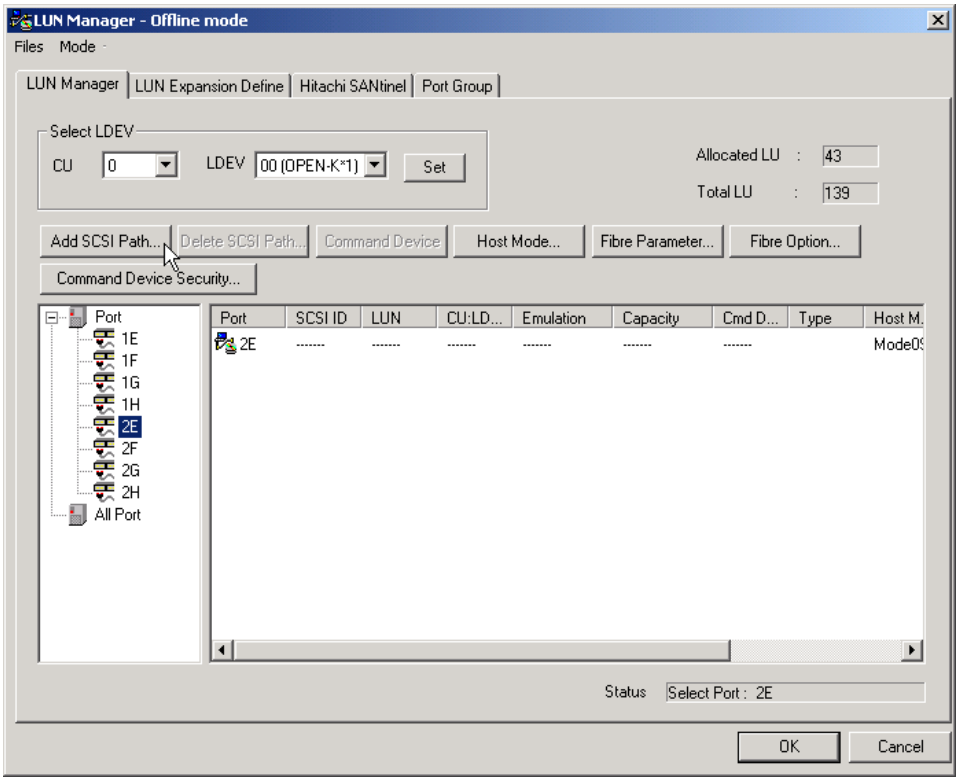


3. In the LUN Expansion dialog:
   a. Enter the desired number of volumes in the **Enter VOL count** box.
   b. Click **OK**.

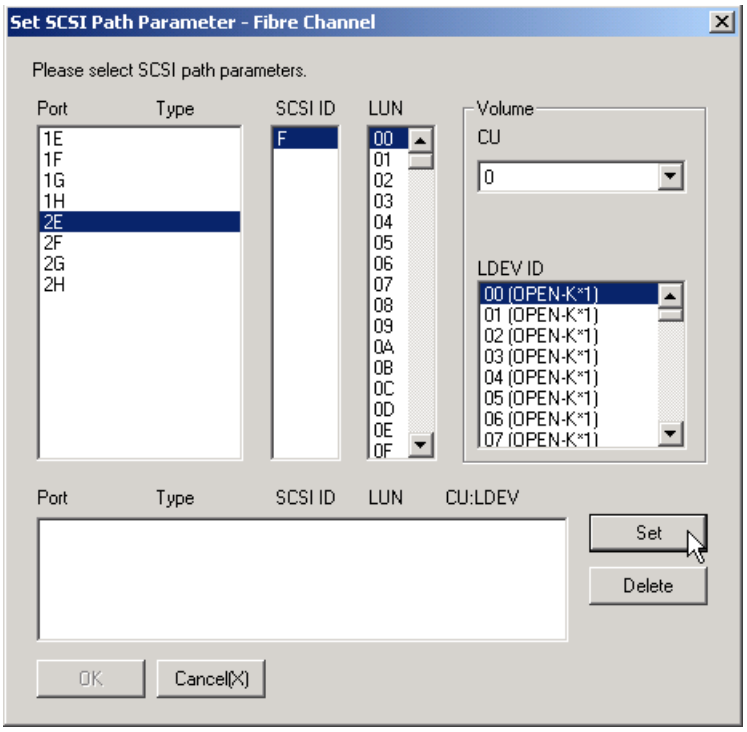


Assigning a Volume to a Port

1. From the LUN Manager tab, select the port to configure and click **Add SCSI Path**:



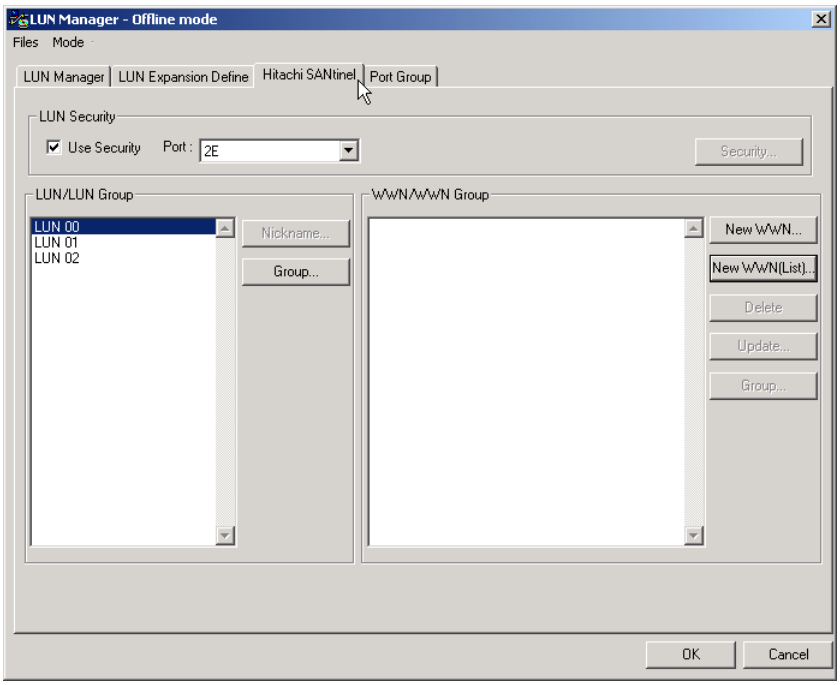
2. From the Set SCSI Path Parameter - Fibre Channel window:
   a. Select the **Port** to assign your target LUN.
   b. Choose the **LUN** to assign the target.
   c. Select the **CU** where the target LUN was originally created.
   d. Select the **LDEV ID**.
   e. Click **Set**.



3. Repeat step 1 to include all the LUNs you want available on the selected port.
4. Click **OK** when you are finished to apply the changes.

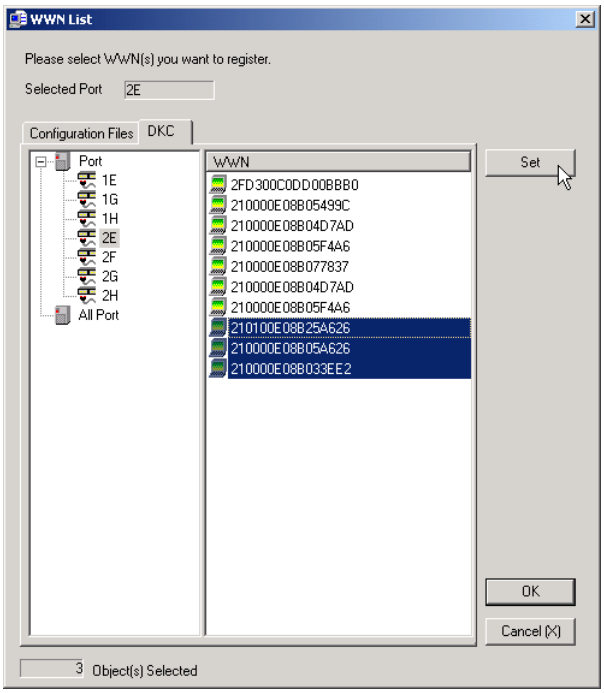
Configuring Security

1. To register WWNs for hosts that will have access to the LUNs you created:
   a. Click the **Hitachi SANtinel** tab.
   b. Check **Use Security**.
   c. Select the port from the **Port** list.
   d. Click **New WWN(List)**.



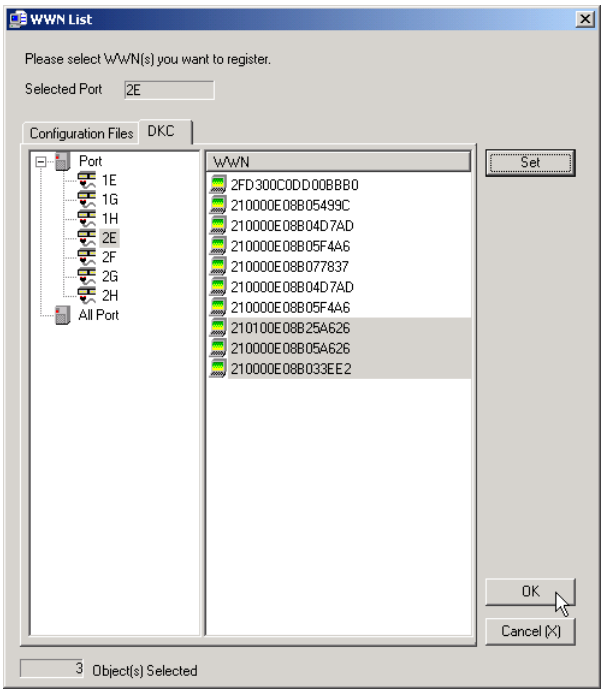
2. From the **WWN List** dialog, click the **DKC** tab and:
   a. Expand the list and select the appropriate **Port**.
   b. Select each **WWN** you want to register for the port.

c. Click **Set**.

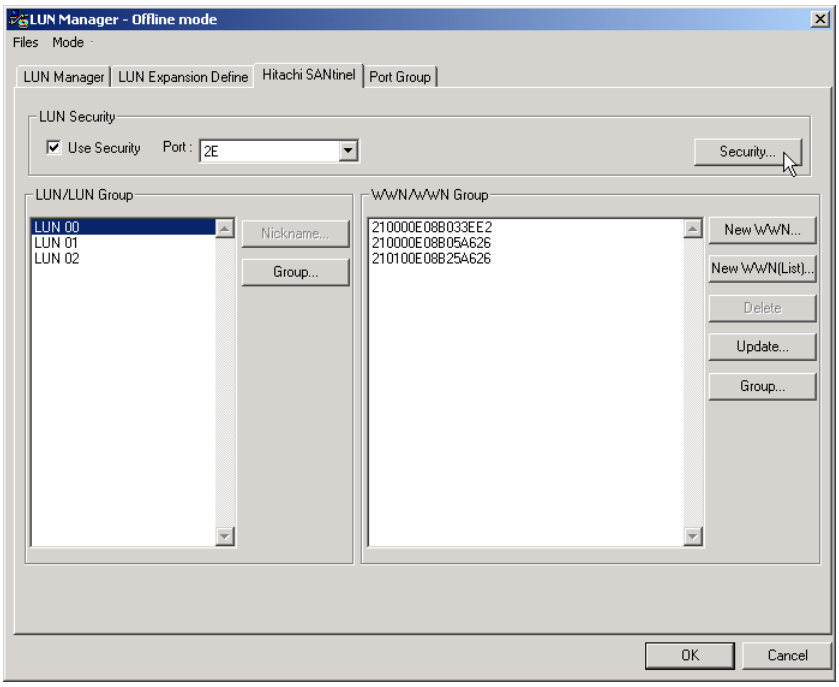

WWN List
Please select WWN(s) you want to register.
Selected Port
2E
Configuration Files
DKC
Port
1E
1G
1H
2E
2F
2G
2H
All Port
WWN
2FD300C0DD00BBB0
210000E08B05499C
210000E08B04D7AD
210000E08B05F4A6
210000E08B077837
210000E08B04D7AD
210000E08B05F4A6
210100E08B25A626
210000E08B05A626
210000E08B033EE2
Set
OK
Cancel (X)
3
Object(s) Selected

3. Click **OK** to confirm the changes:

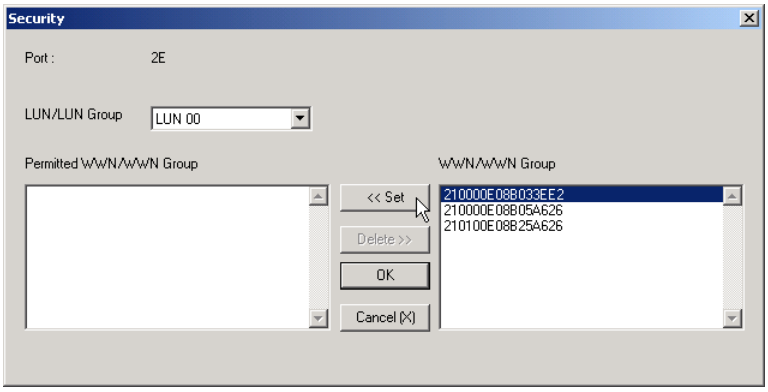
4. Click **OK** to apply the changes:



5. To set LUN security, from the Hitachi SANtinel tab, click **Security**:

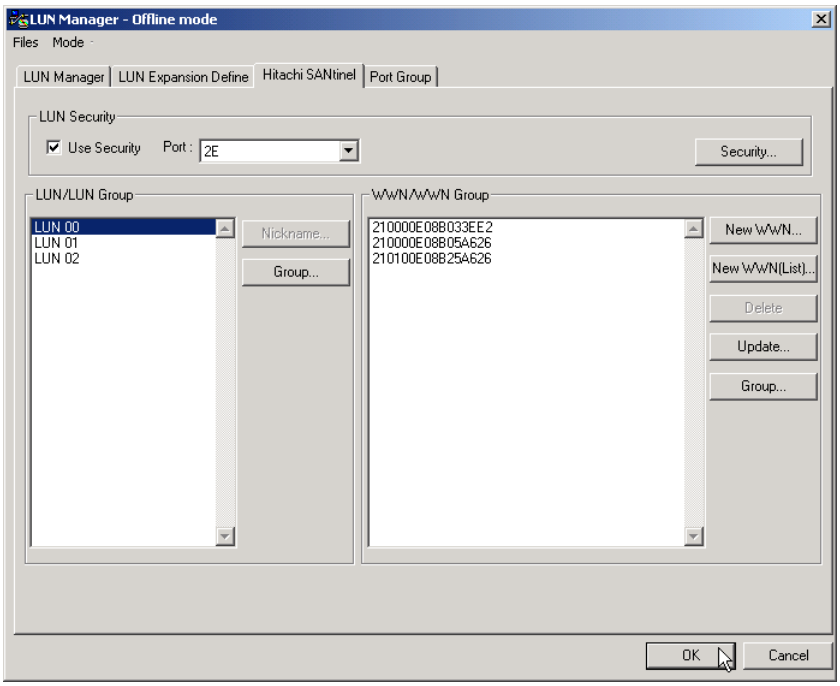


6. From the **Security** window,
   a. Select the **LUN/LUN Group** you want to assign.
   b. Choose one or more WWNs from the **WWN/WWN Group** list.
   c. Click **Set** to move your selection to the **Permitted WWN/WWN Group** list.

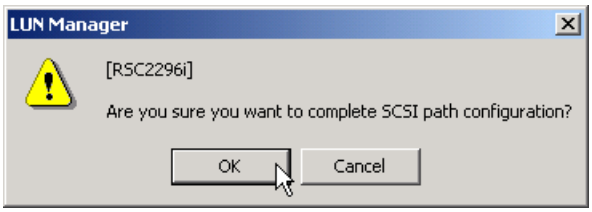


7. Repeat Step 2 for each LUN for which you want to assign WWNs.
8. Click **OK** to apply these changes.

9. From the **LUN Manager – Offline Mode** window click **OK** to apply and save all your configuration settings.



10. Click **OK** at the prompt for confirmation:



11. Click **OK** again to acknowledge completion:

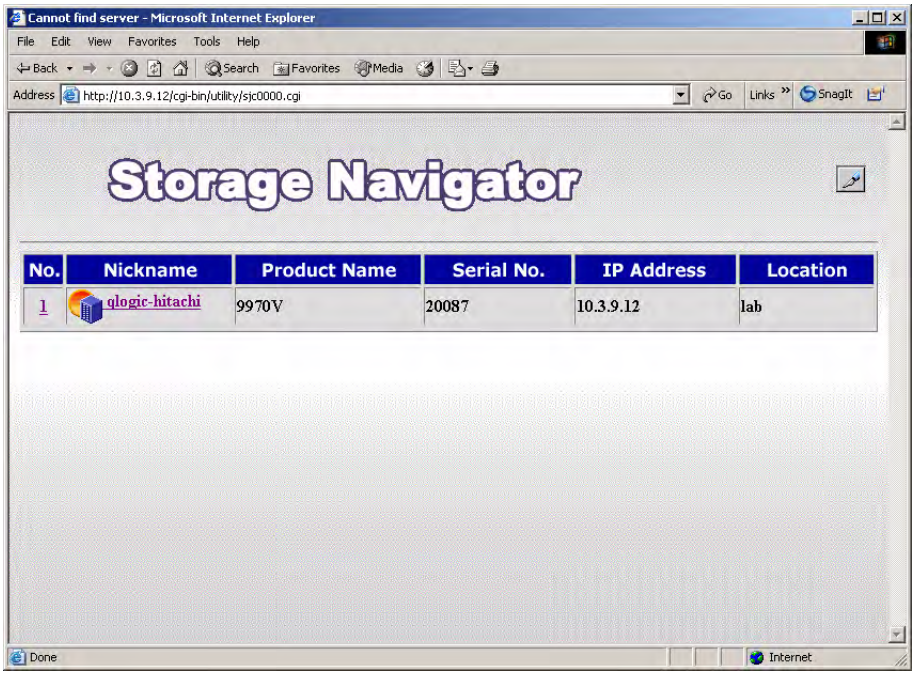
Lightning 9900V Series

The Hitachi Freedom Storage™ Lightning 9900™ V Series is a storage platform offering massive consolidation. It includes the single-cabinet Lightning 9970V and multi-cabinet Lightning 9980V. Follow the steps outlined in these sections to configure your 9900V systems:

- Connecting to the Unit
- Configuring the Host Type
- Configuring the Port Type
- Expanding a Volume
- Assigning a Volume to a Port
- Configuring LUN Security

Connecting to the Unit

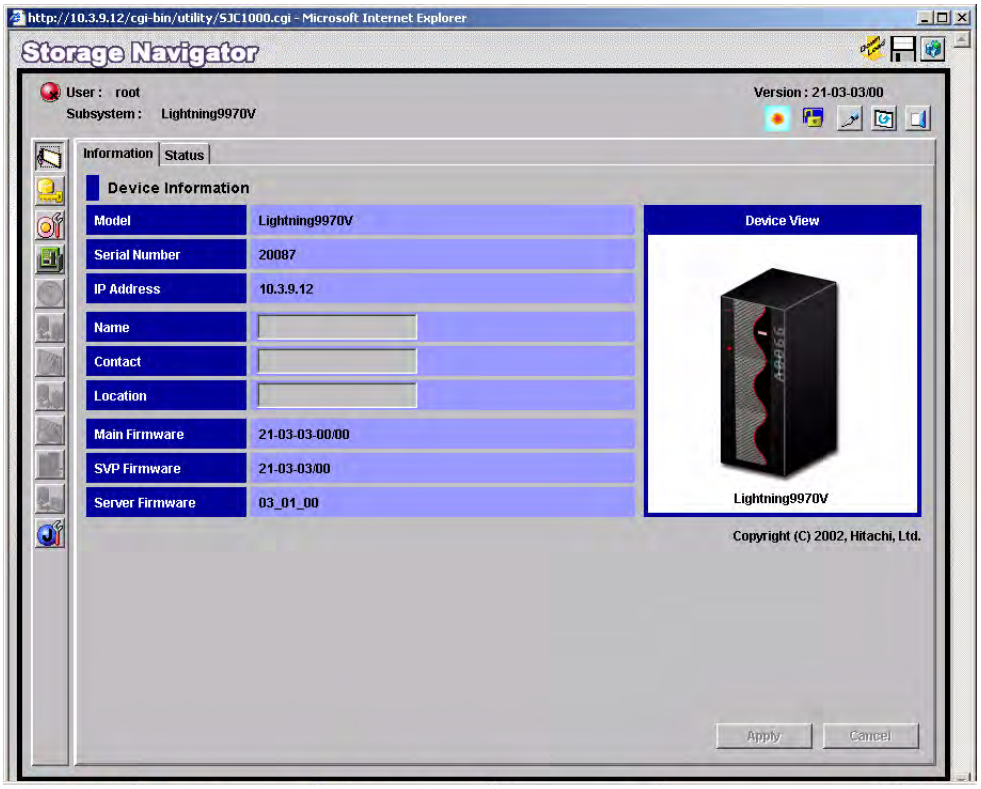
1. Open a web browser, connect to the Storage Navigator and select the storage unit.



NOTE: You must be running Java version 1.3.1 or higher.

2. Enter your User ID and Password at the Storage Navigator login window:

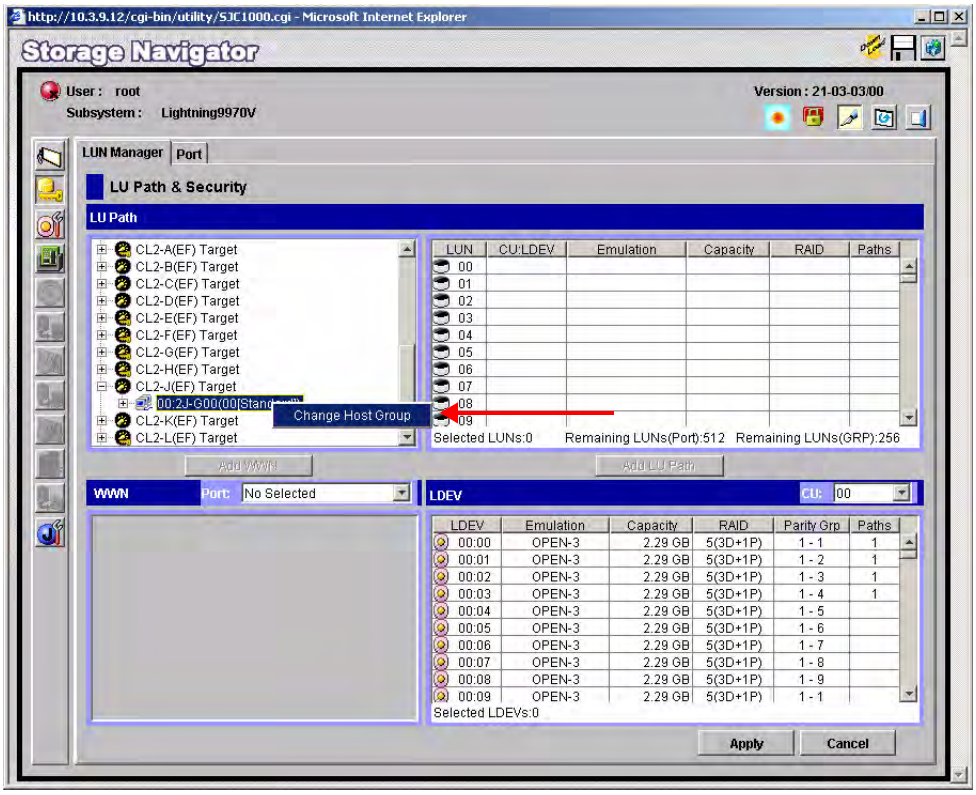
3. From the Storage Navigator, Information tab, click the **View** button.



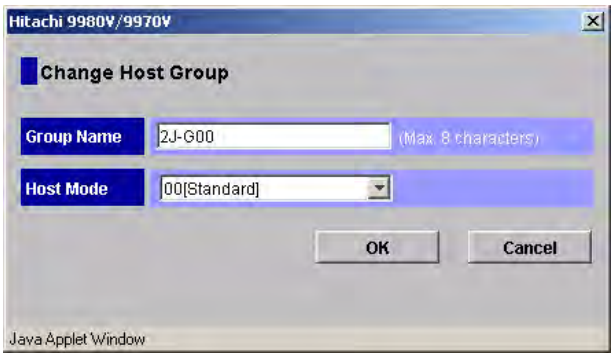
4. Click **OK** to confirm changing modes:

Configuring the Host Type

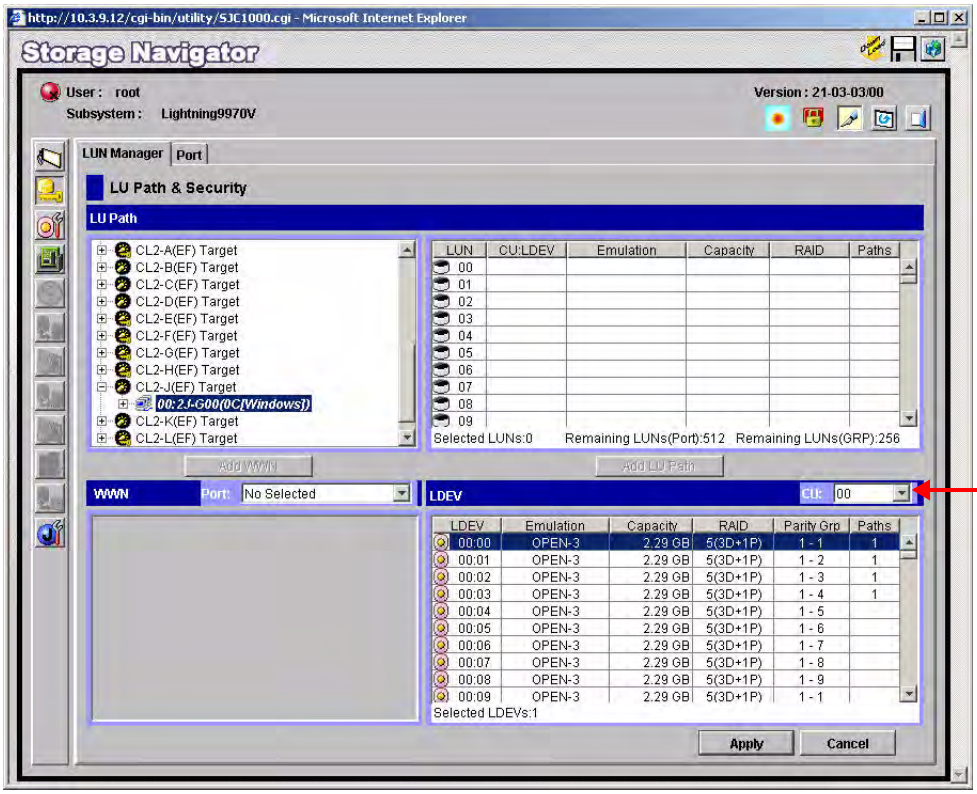
1. Click the LUN Management/LUN Security button.
2. From the LUN Manager tab:
   a. In the LU Path list, select and expand the port you want to use.
   b. Right click on the host group and select **Change Host Group**.



3. From the Change Host Group dialog, select the **Host Mode** from the list and click **OK**.



4. Click **Apply**:

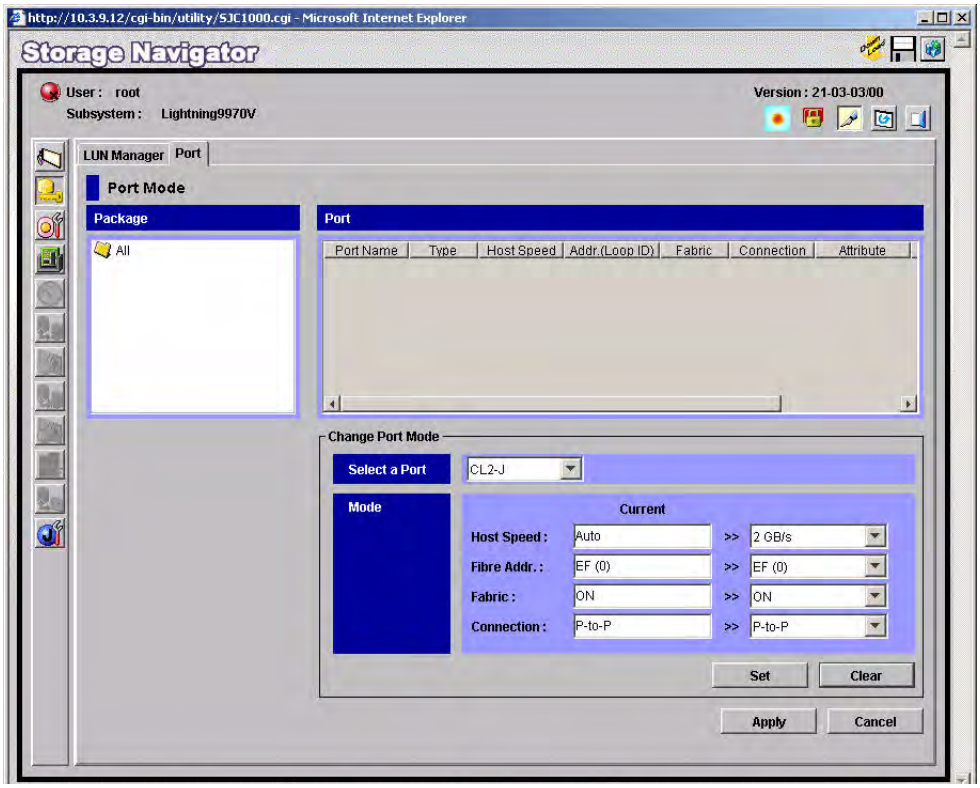


5. Click **OK** to confirm and apply the changes:

Configuring the Port Type

1. From the LUN Manager:
   a. Select the **Port** tab.
   b. Select the port from the list.

c. In the Change Port Mode group, make the desired changes and click **Set**:

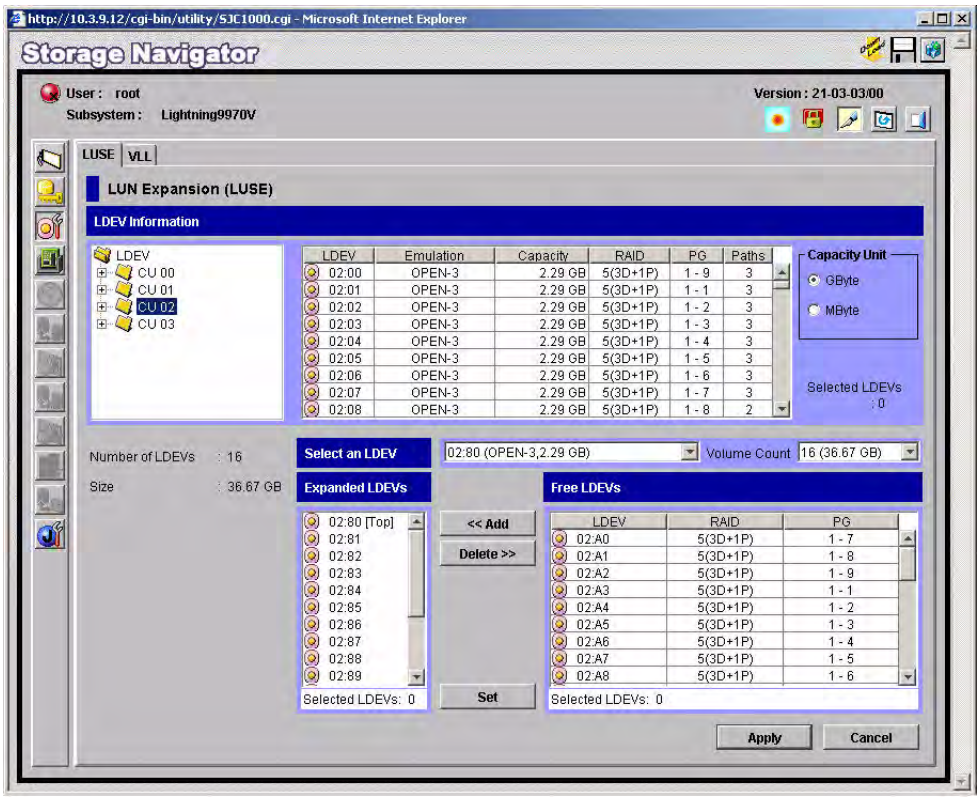


2. Click **OK** to confirm the changes:

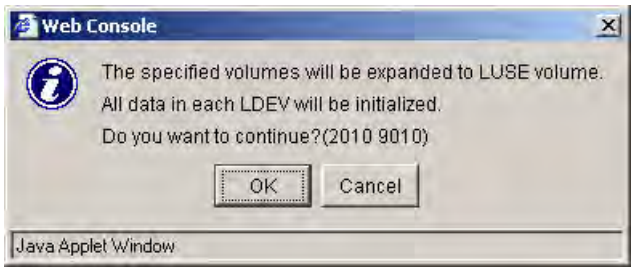
3. Click **Apply** in the Storage Navigator.
4. Click **OK** at the prompt to apply changes.

Expanding a Volume

1. Click the **LUN Expansion/Virtual LDI/LUN** button.
2. From the LUN Expansion (LUSE) tab:
   a. Double-click the **LDEV** folder.
   b. Select a **CU**.
   c. Select an **LDEV** from the pull-down menu.
   d. Select a size from the Volume Count list or select individual LDEVs from the Free LDEVs section and click **Add**.
   e. Click **Set**.



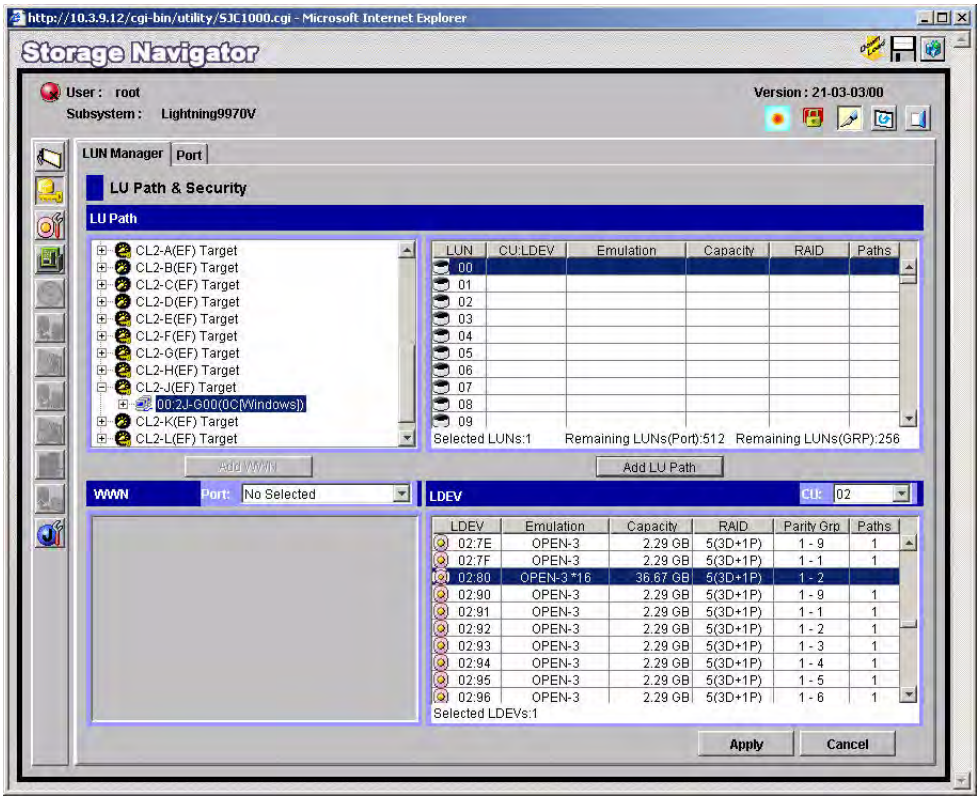
3. Click **OK** to confirm and apply the changes:



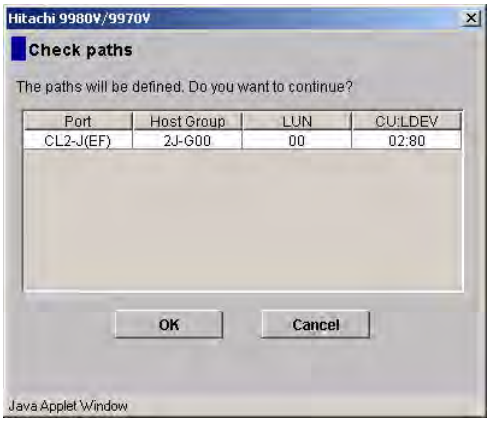
4. Click **Apply** in the Storage Navigator.
5. Click **OK** at the prompt to apply changes.

Assigning a Volume to a Port

1. Click the **LUN Management/LUN Security** button.
2. From the LUN Manager tab:
   a. Select and expand the port from the LU Path group box.
   b. Select the host group in the expanded port list.
   c. Select the **CU** and **LDEV**(s) from the LDEV group box.
   d. Select the **LUNs** the host will use.
   e. Click **Add LU Path**.



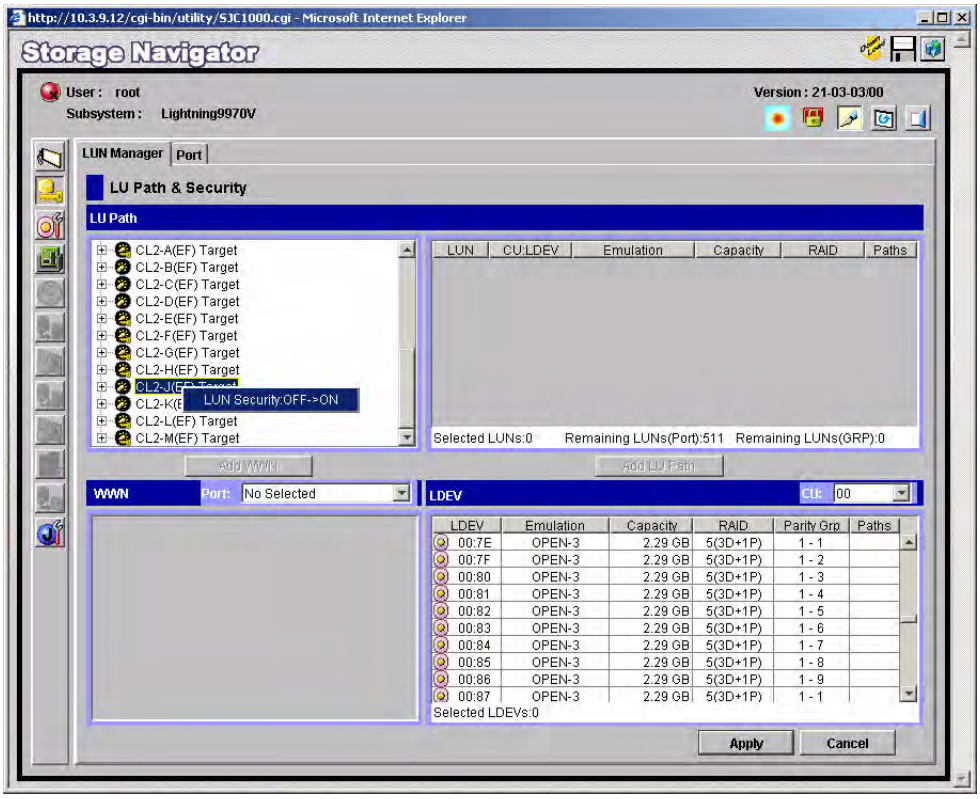
3. In the Check Paths dialog, verify the path information and click **OK**.



4. Click **Apply** in the Storage Navigator.
5. Click **OK** at the prompt to apply changes.

Configuring LUN Security

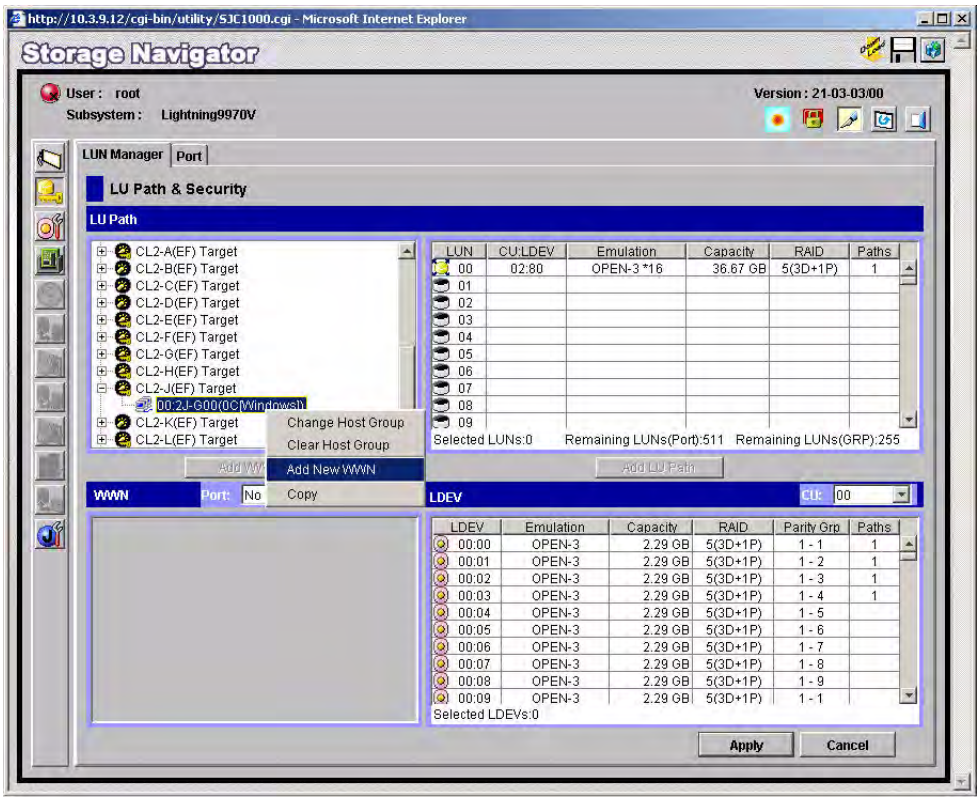
1. From the LUN Manager tab, right-click on the port and select **LUN Security: OFF->ON**.



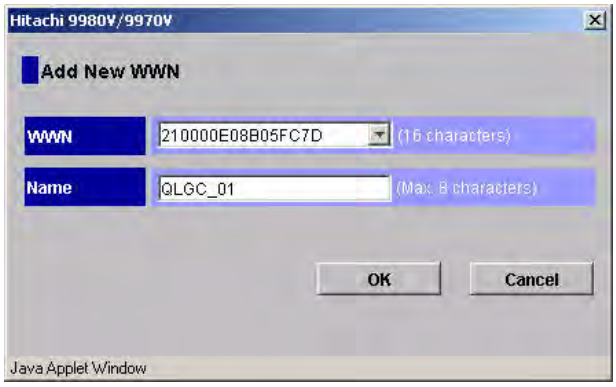
2. Click **YES** to confirm and proceed with the settings:

3. Expand the port in the LU Path list.

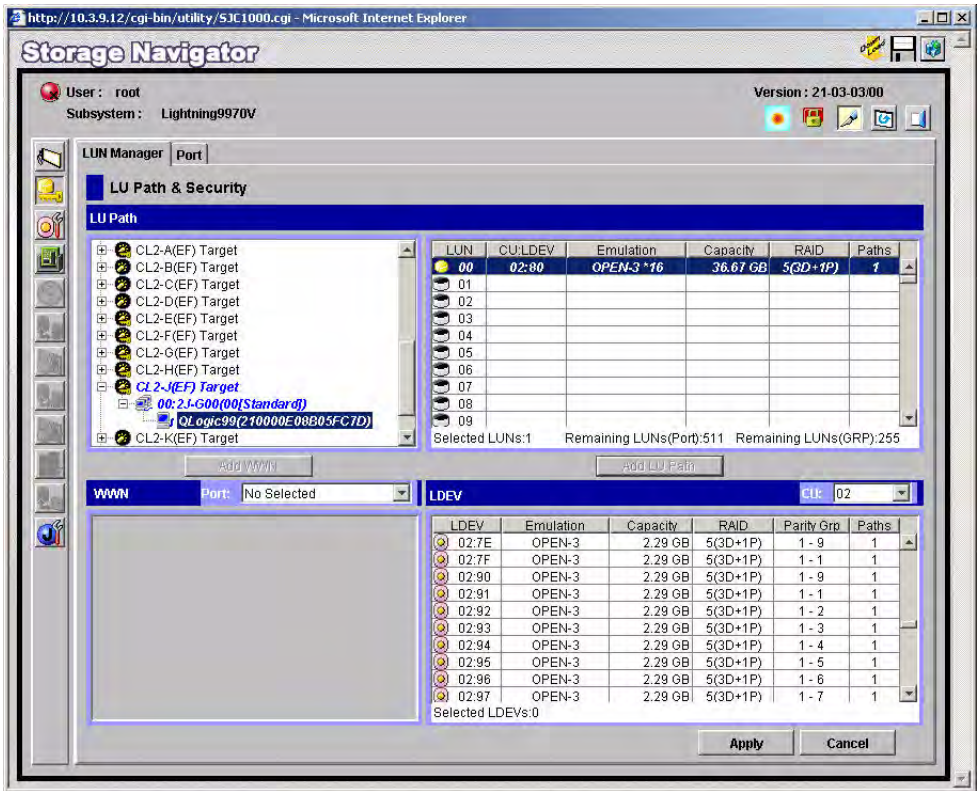
4. Right-click on the host group and select **Add New WWN**.



5. Select a **WWN** and enter a **Name** (optional) in the Add New WWN dialog:



6. Click **Apply** in the Storage Navigator:



7. Click **OK** to confirm and apply the changes:

Storage Network Configuration

This section provides instructions to set up and configure the QLogic Fibre Channel switches in the SANbox 5000 Series and the SANbox2-64. Completing the configuration steps in this section prepares the network for host and storage connections.

Fibre Channel Switches from QLogic

Deployed as standalone units or in multi-stage fabrics of any size, QLogic SANbox switches come with all the software tools necessary to create easy-to-manage, resilient and intelligent SANs. For additional information, see http://www.qlogic.com/products/fc_san_switchs.asp.

SANbox 5000 Series Stackable Switches

The SANbox 5000 Series switches provide the same benefits as stackable IP switches for your SAN. The SANbox 5200 is the first switch in the new SANbox 5000 Series, providing the benefits of stackable IP switches for your SAN. With up to sixteen 2Gb ports plus a four-pack of high-speed 10Gb ISL ports, each 5200 stackable switch provides maximum flexibility for configuring, managing and scaling SANs.

The SANbox 5602 stackable switch delivers the benefits of stackable IP switches for high performance 4Gb SANs. With up to sixteen 4Gb ports plus a four-pack of high-speed 10Gb ISL ports, each 5000 Series stackable switch provides maximum flexibility for workgroup or enterprise class SANs.

SANbox2-64 Switches

The SANbox2-64 switches offer a scalable, highly available solution to protect the investment in your SAN backbone. These next-generation switches bring performance, reliability and simplicity to storage networking. The SANbox2-64 switch is designed to meet the needs of your growing enterprise.

Configuration Process

The configuration process for your SANbox switch involves three stages described in the following sections:

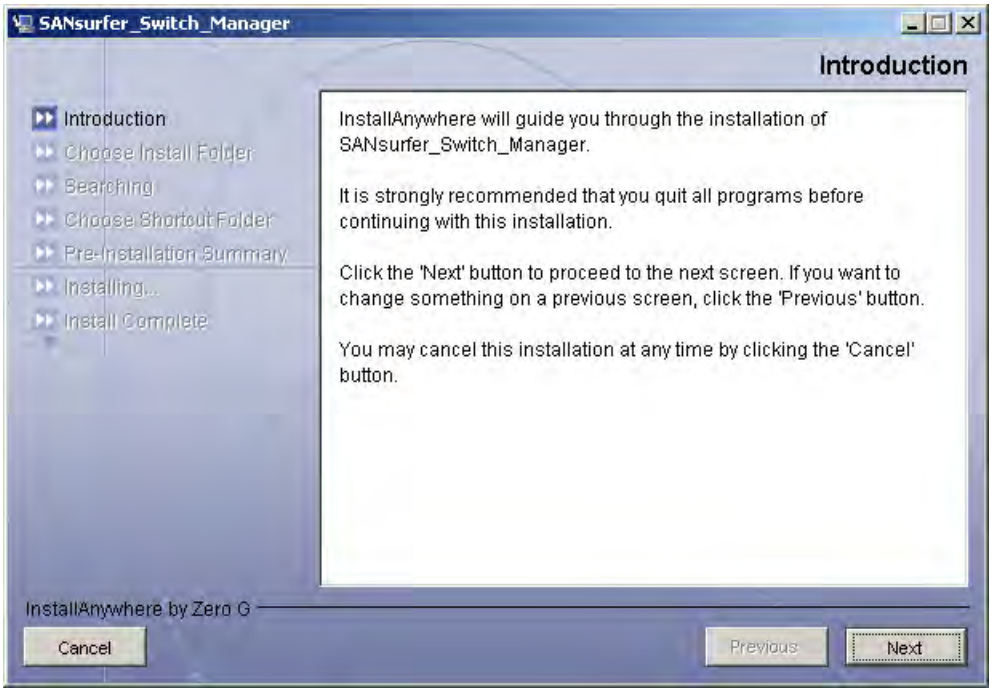
- Installing the SANsurfer Switch Manager
- Initial Switch Configuration
- Switch-Specific Configuration Steps

Installing the SANsurfer Switch Manager

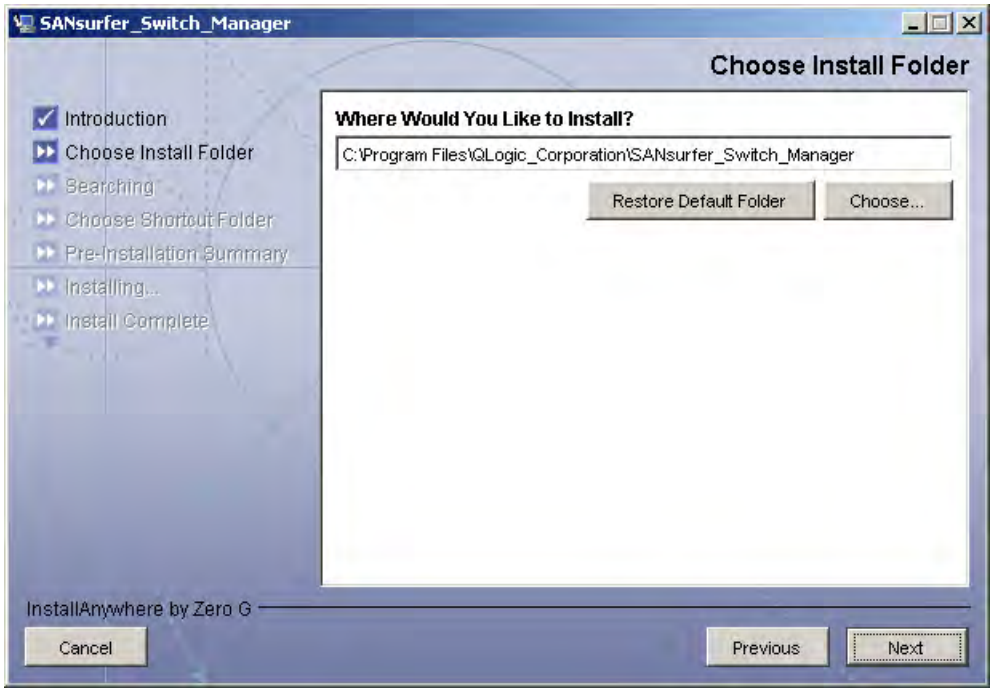
You can use the SANsurfer Switch Manager to configure both the SANbox 5000 series and the SANbox2-64. To install the SANsurfer Switch Manager, follow these steps:

NOTE: The following steps explain how to download and install the SANsurfer Switch Manager separately from the SANsurfer Management Suite.

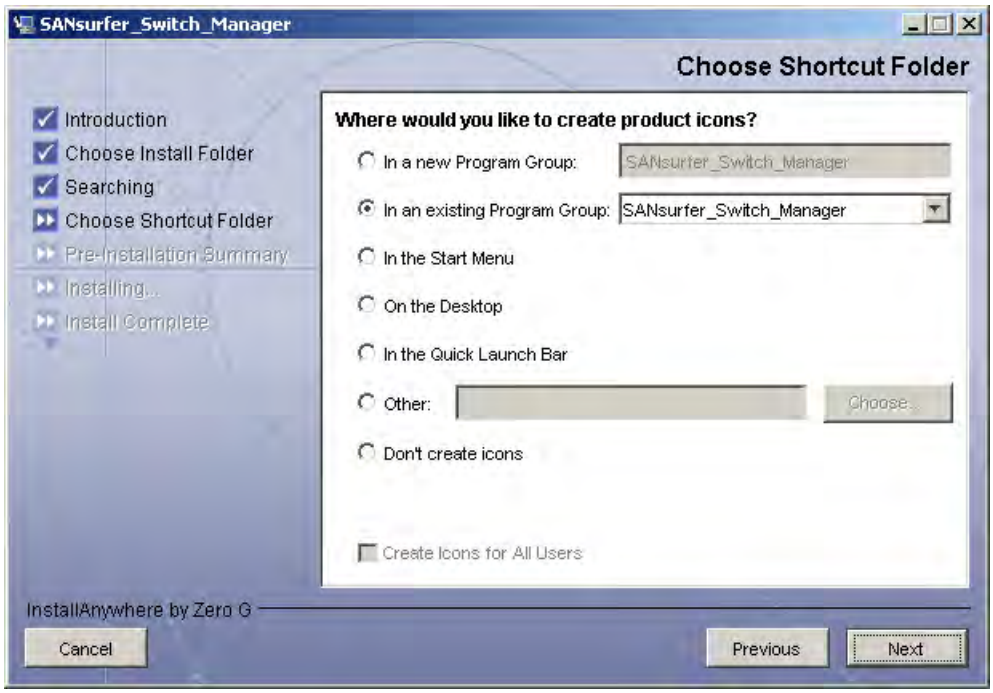
1. Download the SANsurfer Switch Manager from the Download section of the QLogic website (http://www.qlogic.com/support/drivers_software.asp) and double-click the icon to start the installation.
2. From the Introduction screen, click **Next**:



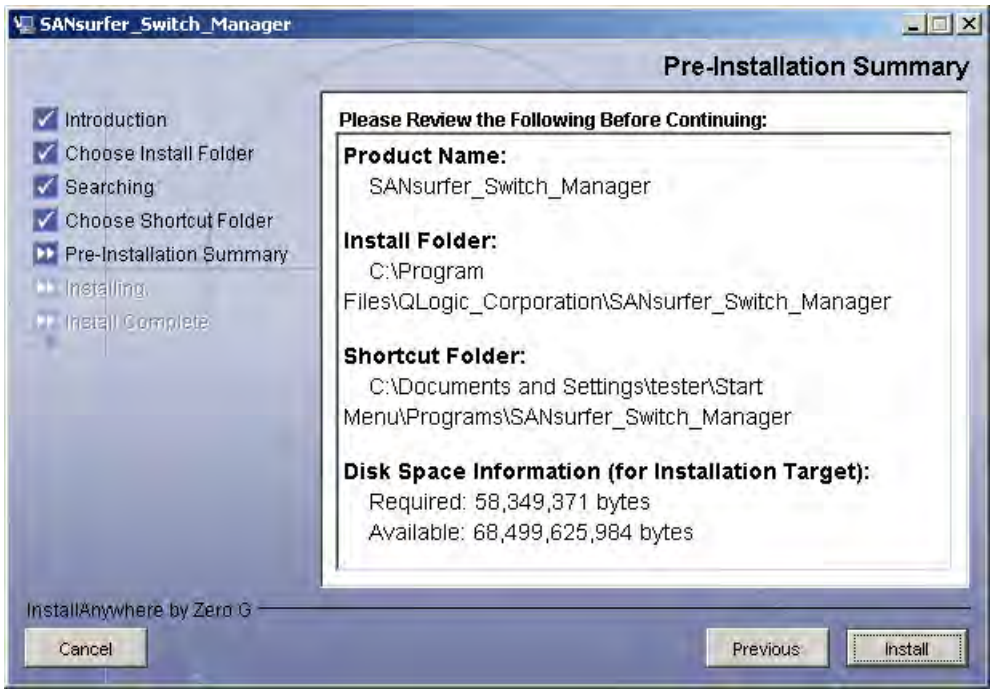
3. From the Choose Install Folder screen:
   a. Select an installation folder.
   b. Click **Next**.



4. Select the desired shortcut location and click **Next**.



5. Review the Pre-Installation Summary and click **Install** to begin the installation:

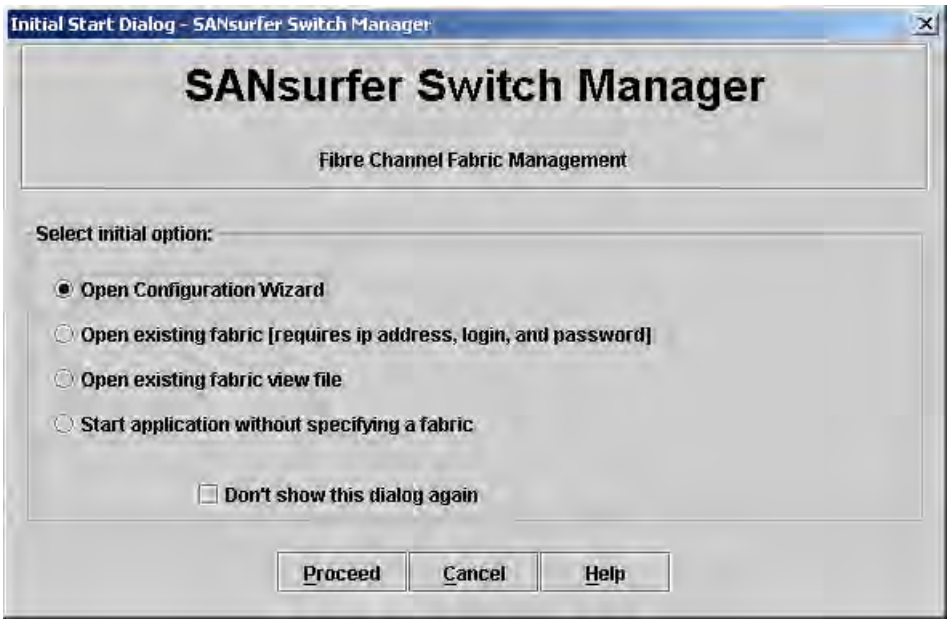


6. Click **Done** when the installation is complete.

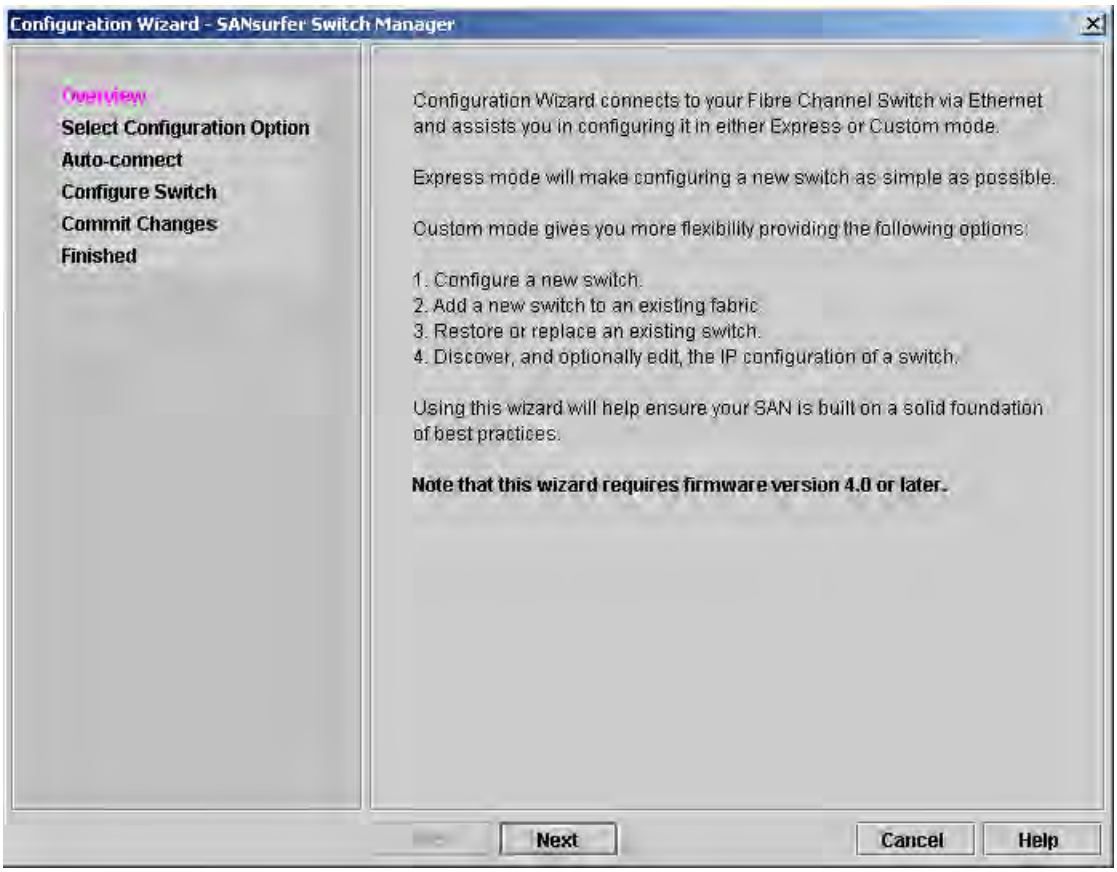
Initial Switch Configuration

Perform the following steps for either the SANbox2-64 or a SANbox 5000 Series switch:

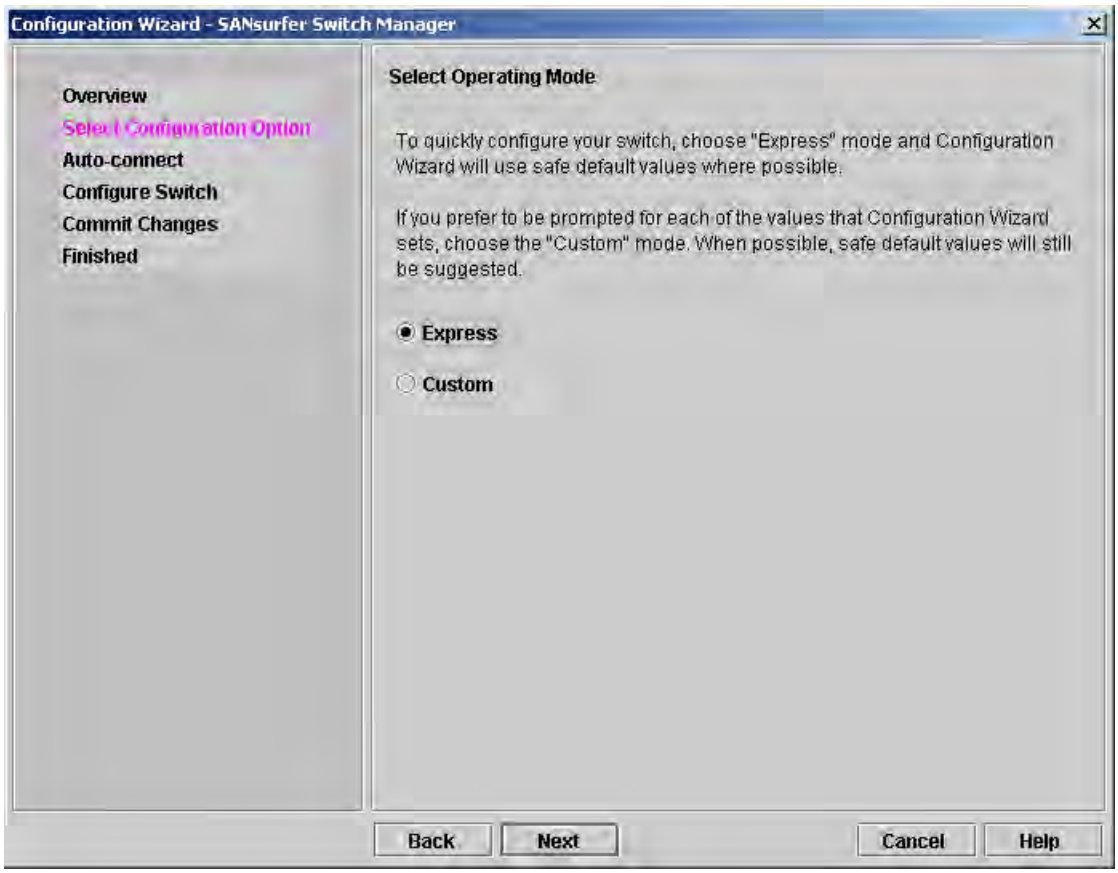
1. Launch SANsurfer Switch Manager.
2. From the Initial Start Dialog:
   a. Select **Open Configuration Wizard**.
   b. Click **Proceed**.



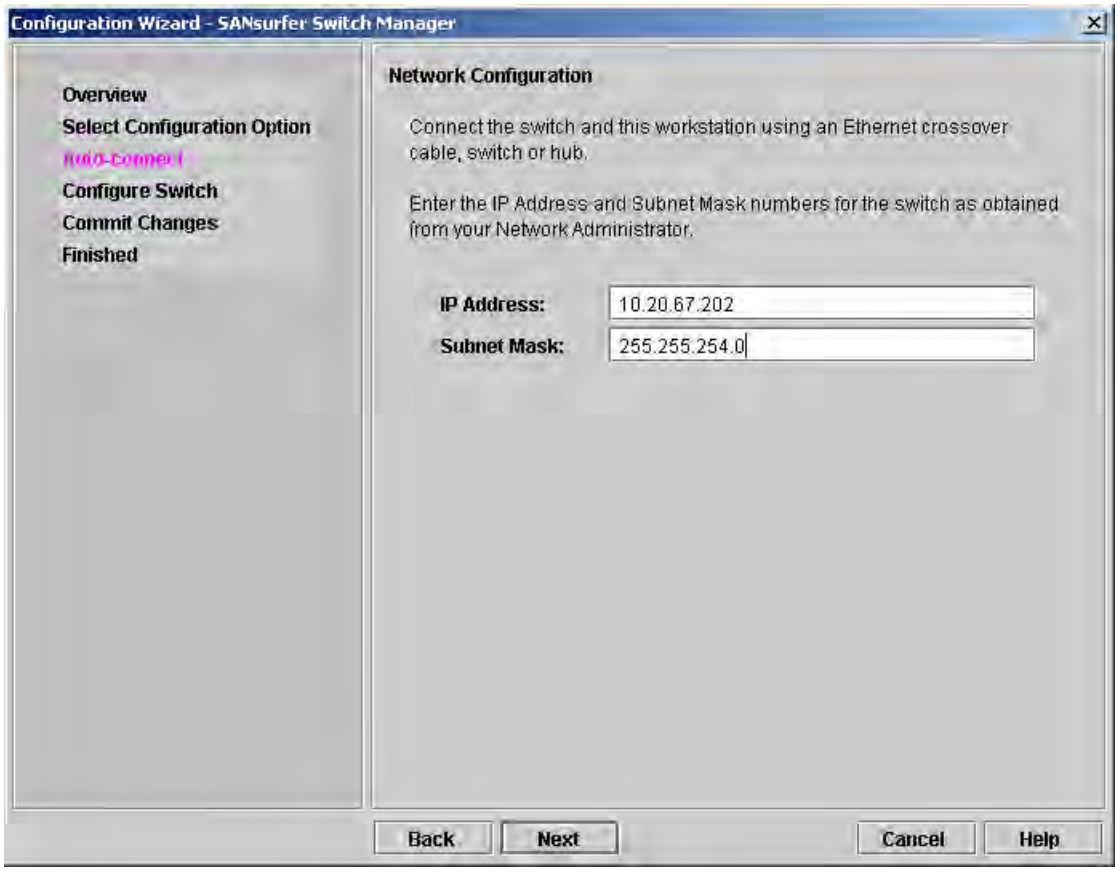
3. From the Overview window, click **Next**:



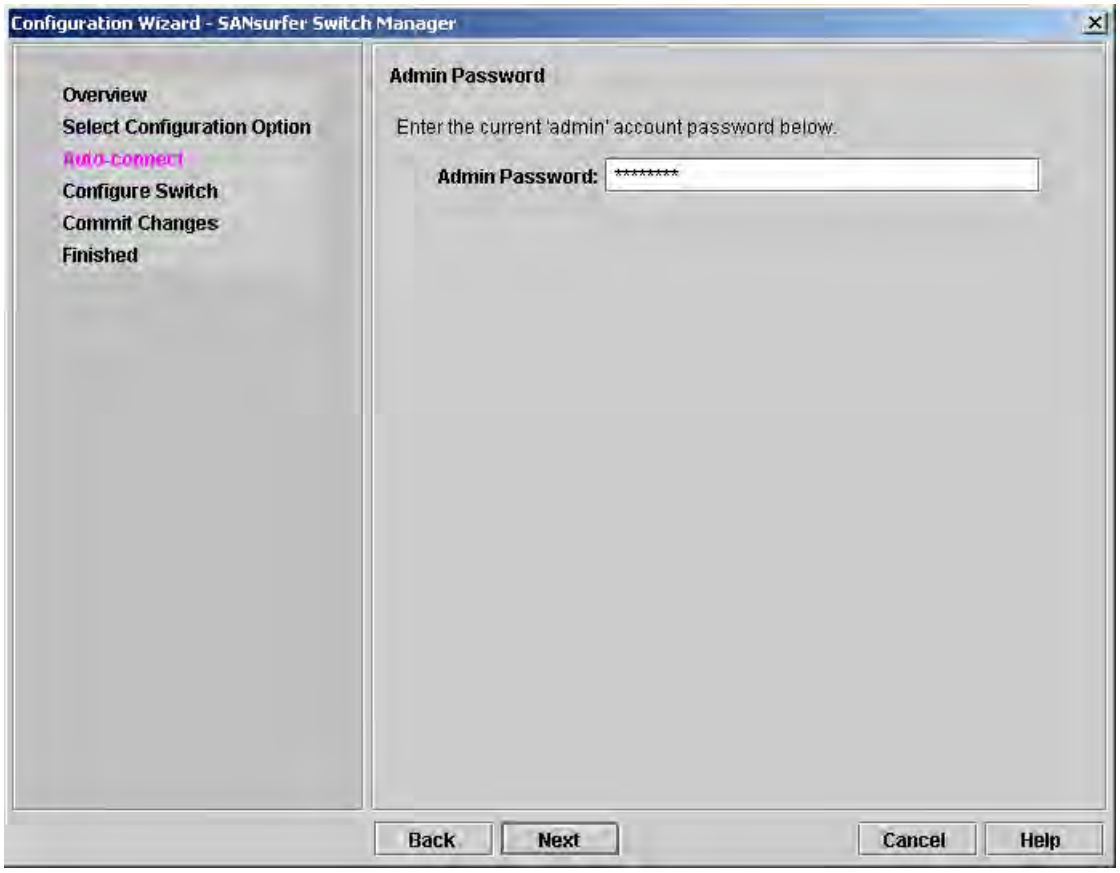
4. From the Select Operating Mode window:
   a. Select **Express**.
   b. Click **Next**.



5. From the Network Configuration window:
   a. Enter a temporary IP address and Subnet Mask.
   b. Click **Next**.

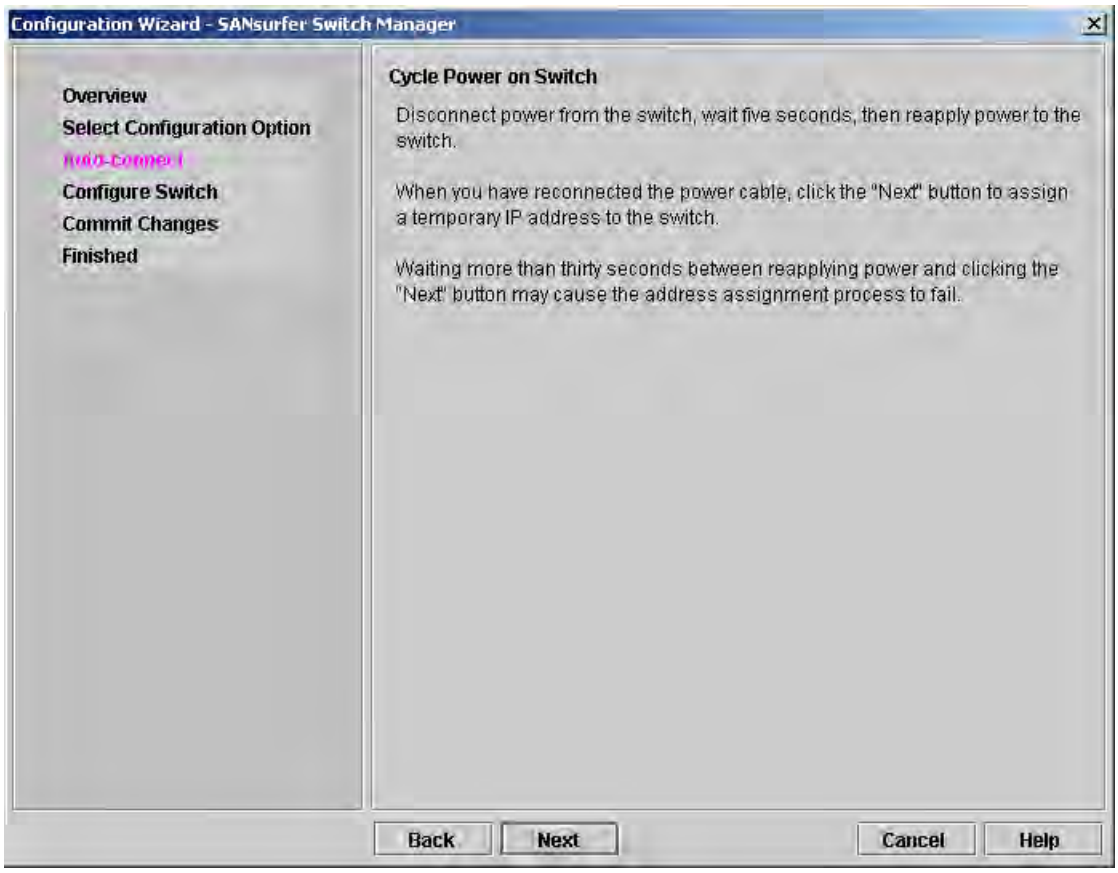


6. Enter "password" into the Admin Password field and click **Next**.

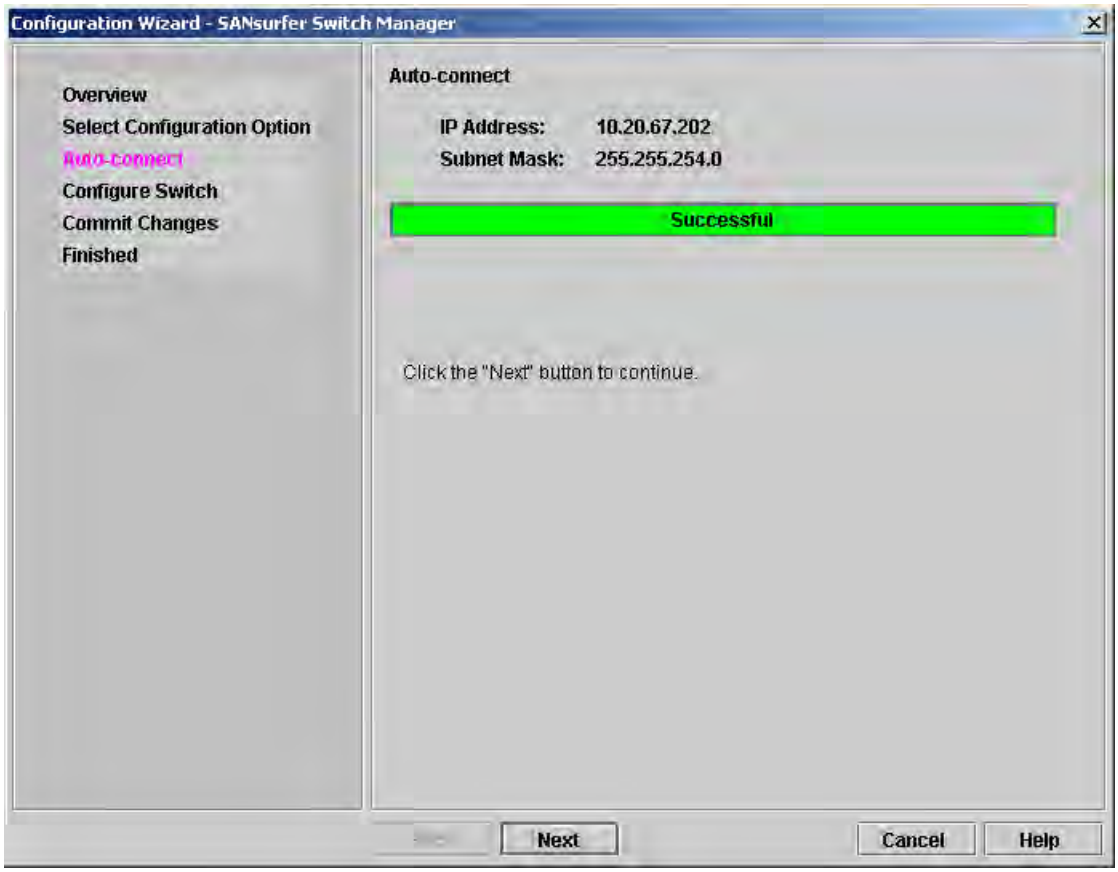


NOTE: User authentication is enabled by default.

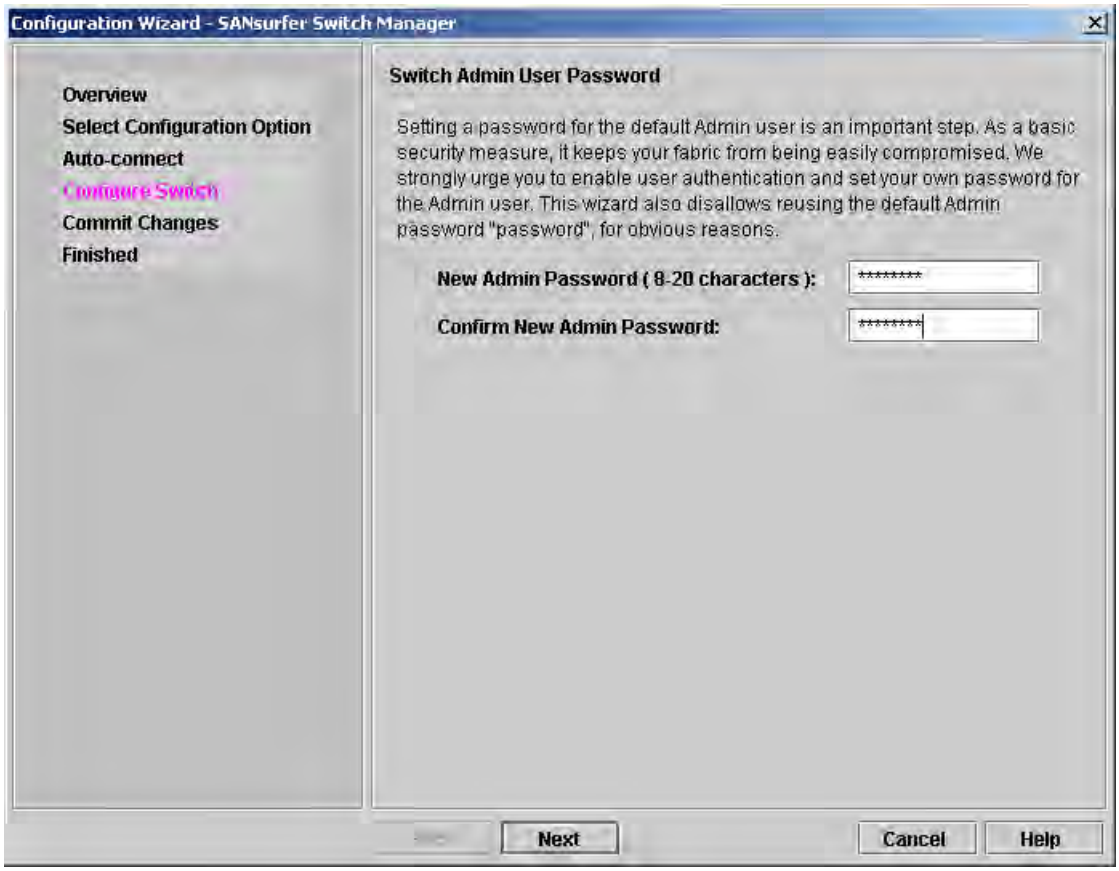
7. When the Cycle Power on Switch window displays:
   a. Power on or cycle power on the switch.
   b. Click **Next** after re-applying power to the switch.



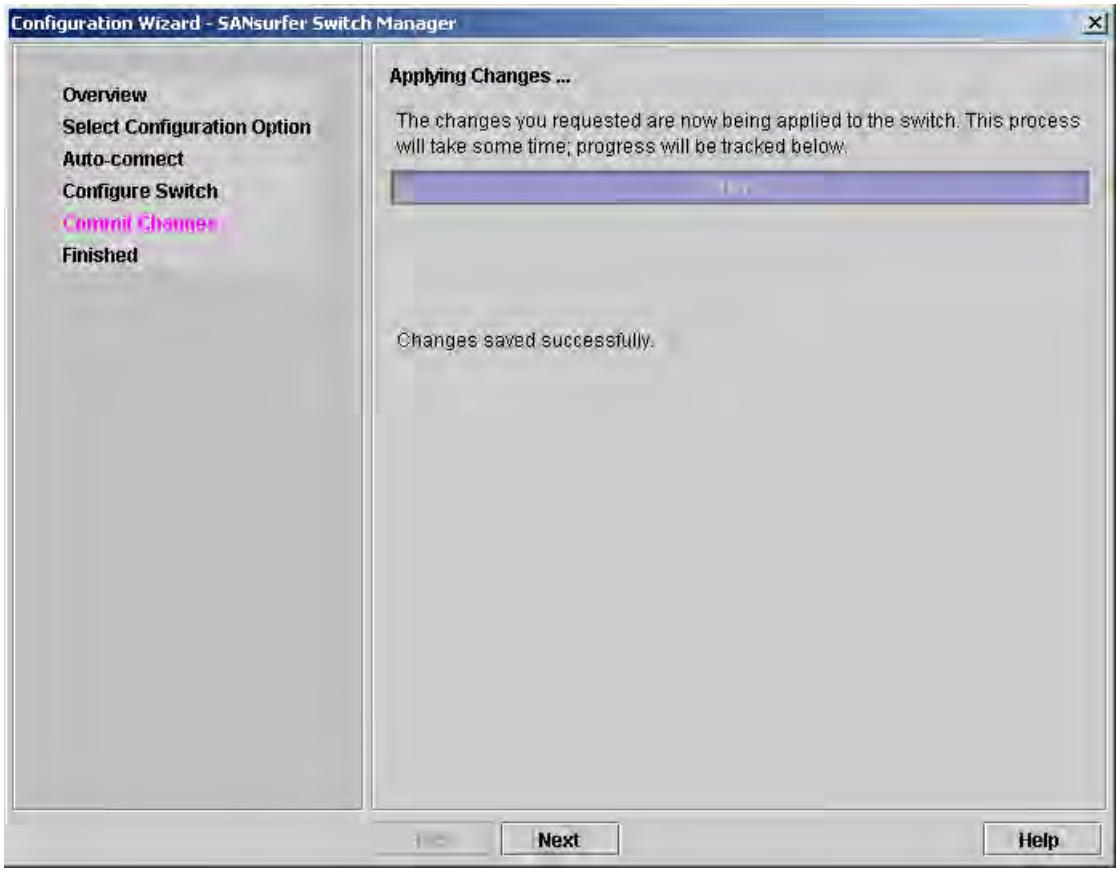
8. Click **Next** wen the initial network configuration is complete:



9. Enter a new password for the **Admin** account and click **Next**:



10. Click **Next** to commit all the changes:



11. Click **Close** to exit the configuration wizard:

Command Line Configuration

You can use the following serial port settings to perform the command line switch configuration:

- Baud Rate: 9600
- Data Bits: 8
- Parity: None
- Stop Bits: 1
- Flow Control: None

To configure the switch from the command line, follow these steps:

1. Log in to the switch.
2. Enter administrator mode:

```
SANbox #> admin start
```

3. Start the switch setup program to configure the IP address by typing this command:

```
SANbox (admin) #> set setup system
```

4. When the setup program runs, follow the command line instructions. For example:

```
A list of attributes with formatting and current values will follow.
Enter a new value or simply press the ENTER key to accept the current value.
If you wish to terminate this process before reaching the end of the list
press 'q' or 'Q' and the ENTER key to do so.
Eth0NetworkDiscovery (1=Static, 2=Bootp, 3=Dhcp, 4=Rarp) [Static ]
Eth0NetworkAddress (dot-notated IP Address) [0.0.0.0 ] <IP Address>
Eth0NetworkMask (dot-notated IP Address) [0.0.0.0 ] <Netmask>
Eth0GatewayAddress (dot-notated IP Address) [0.0.0.0 ] <Gateway>
AdminTimeout (dec value 0-1440 minutes, 0=never) [30 ]
InactivityTimeout (dec value 0-1440 minutes, 0=never) [0 ]
LocalLogEnabled (True / False) [True ]
RemoteLogEnabled (True / False) [False ]
RemoteLogHostAddress (dot-notated IP Address) [10.0.0.254 ]
NTPClientEnabled (True / False) [False ]
NTPServerAddress (dot-notated IP Address) [10.0.0.254 ]
EmbeddedGUIEnabled (True / False) [True ]
Do you want to save and activate this system setup? (y/n): [n] y
System setup saved and activated.
```

Switch-Specific Configuration Steps

The additional steps to configure your SANbox switch are similar, whether you use the SANbox 5000 Series or the SANbox2-64. After you install the SANsurfer Switch Manager and perform the initial switch configuration, refer to the appropriate section for your switch:

- SANbox 5000 Series Configuration
- SANbox2-64 Configuration

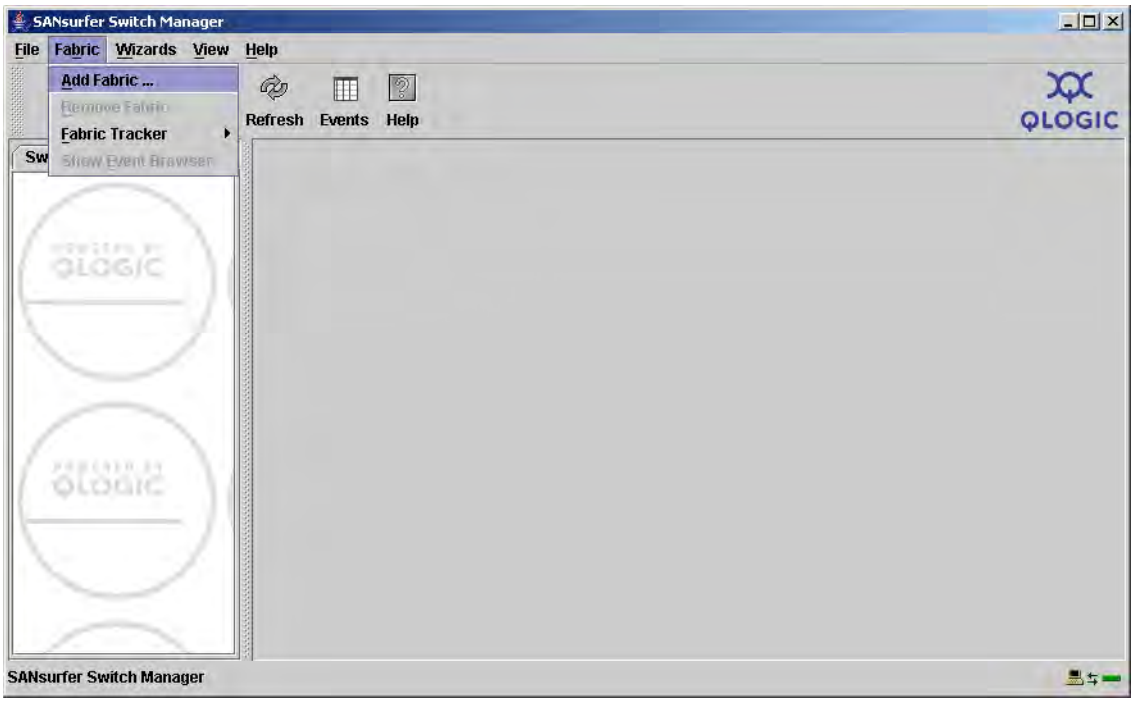
SANbox 5000 Series Configuration

The following procedures explain how to configure a SANbox 5000 series switch and verify the connections:

- Command Line Configuration
- Configuring Port Properties
- Connecting Cables
- Configuring Zones

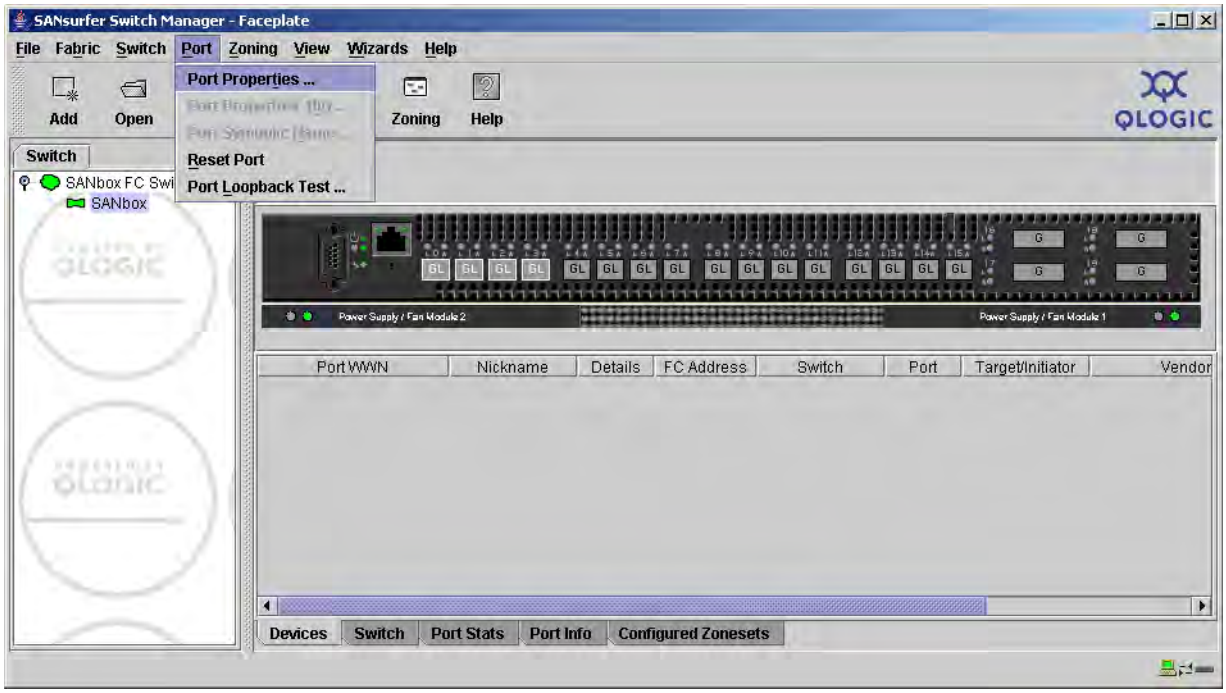
Configuring Port Properties

1. From the SANsurfer Switch Manager, select **Add Fabric** from the Fabric menu:

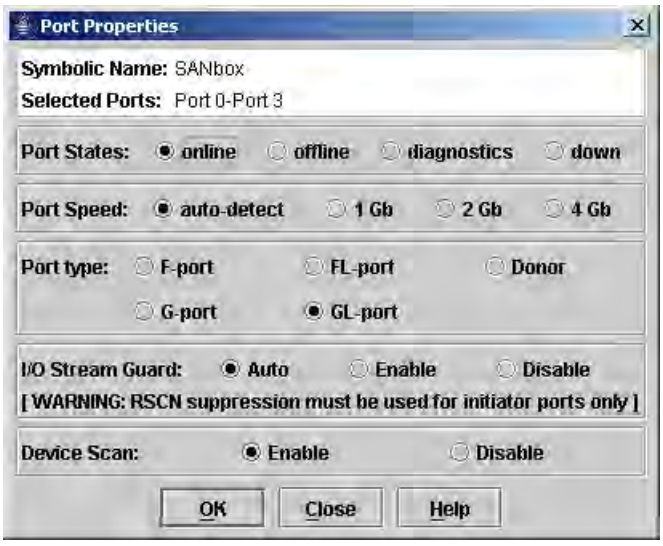


2. From the Add a New Fabric dialog:
   a. Enter a **Fabric Name**, **IP Address**, **Login Name**, and **Password**.
   b. Click **Add Fabric**.

3. From the SANsurfer Switch Manager – Faceplate window:
   a. Select the switch you want to configure.
   b. Select one or more 1/2/4Gb ports from the faceplate.
   c. Select **Port** Properties from the Port menu.



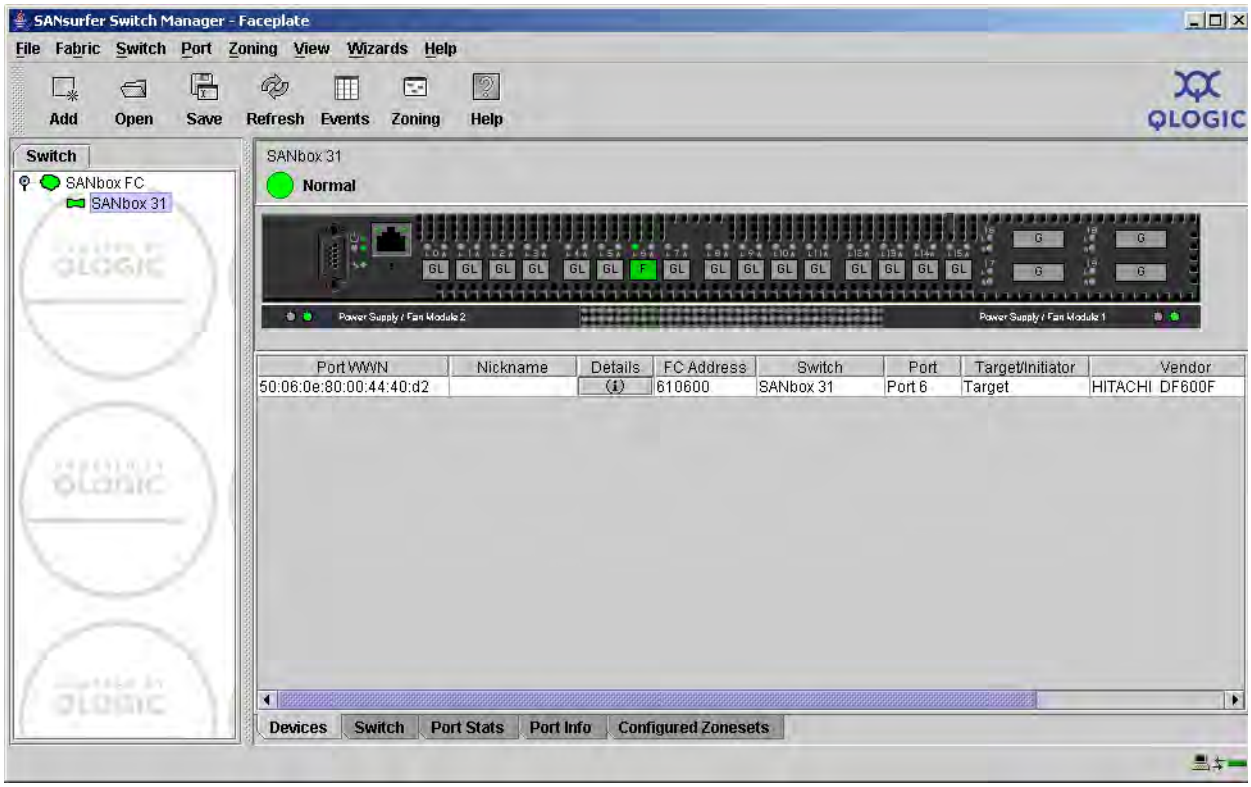
4. From the Port Properties dialog:
   a. Select the desired port settings.
   b. Click **OK**.



5. Click **OK** to close the Updating Port Properties message:

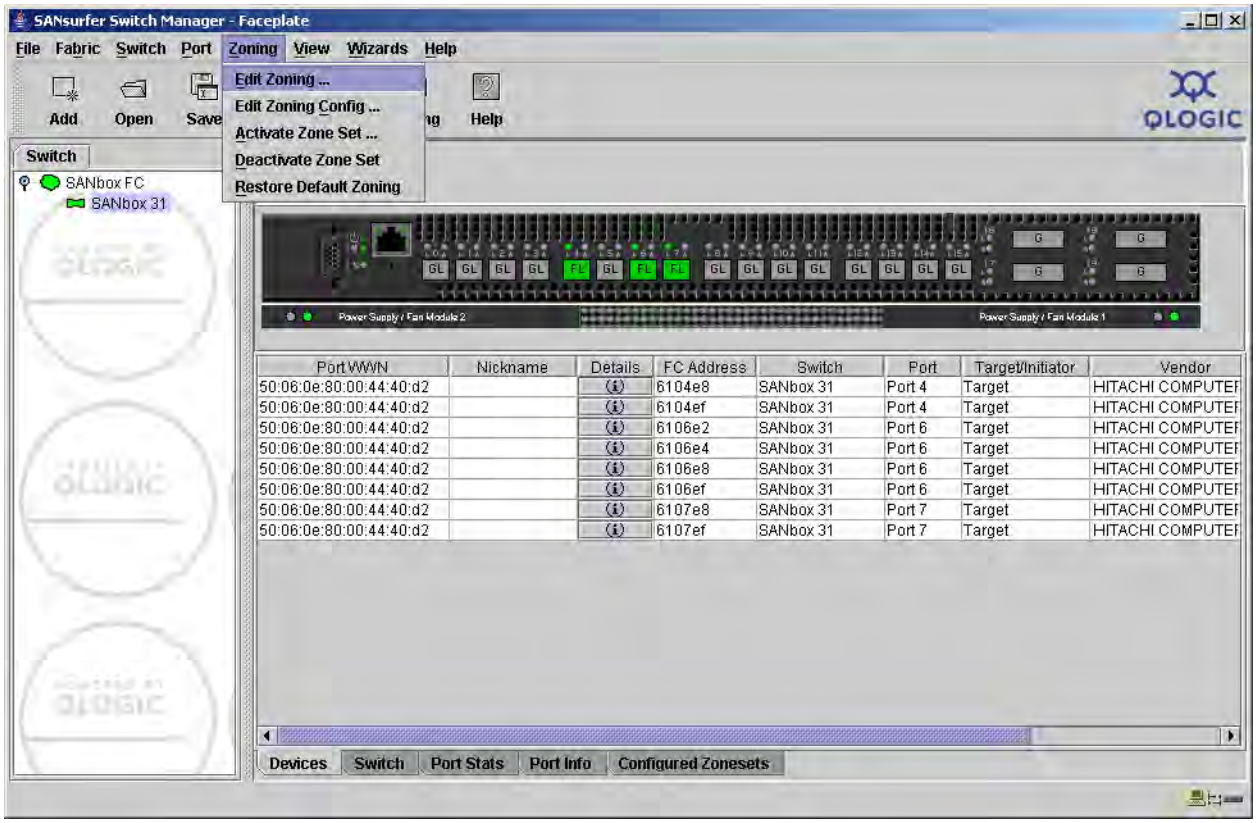
Connecting Cables

1. Connect the devices to the SANbox 5000 series switch ports you configured.
2. Verify that the green Login LED is illuminated for each device.
3. Launch SANsurfer Switch Manager and connect to the SANbox 5200.
4. From the SANsurfer Switch Manager – Faceplate window, verify that all devices are listed.

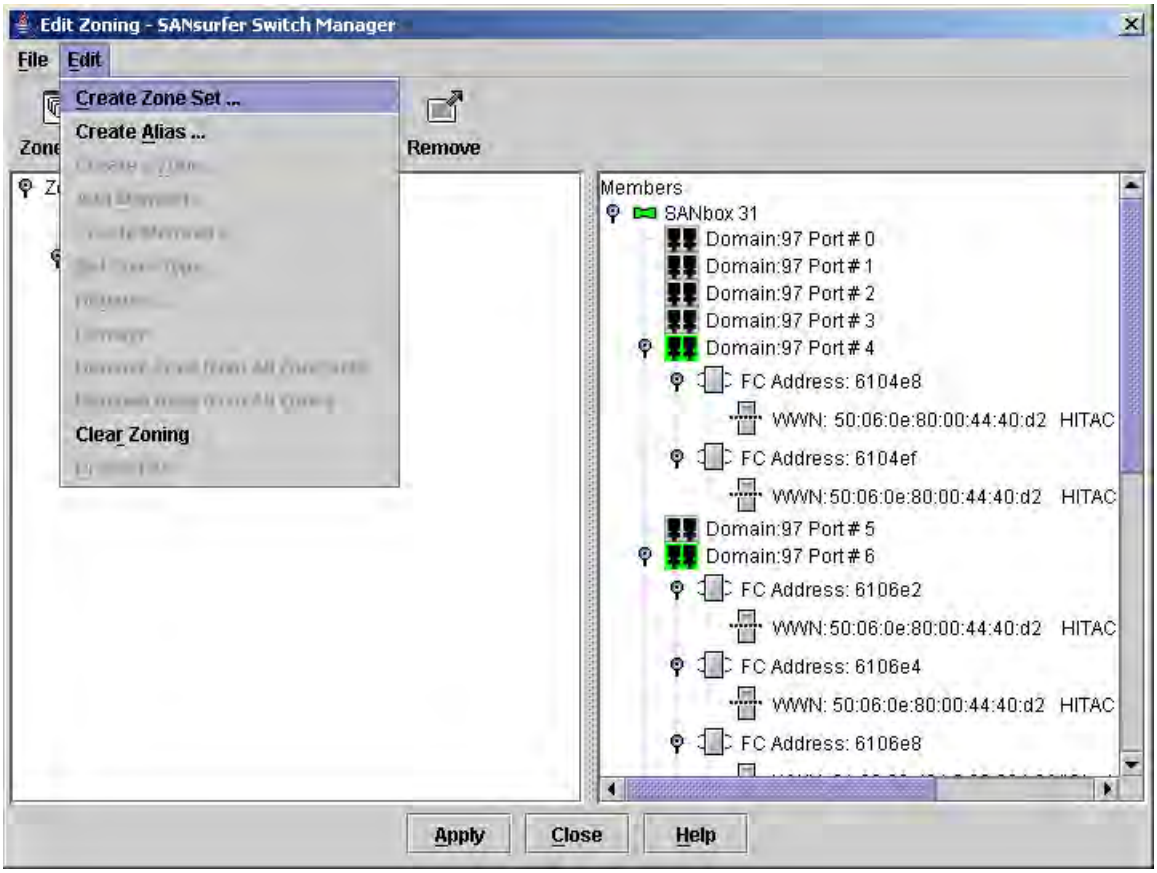


Configuring Zones

1. Launch the SANsurfer Switch Manager and connect to the SANbox 5000 series switch.
2. From the SANsurfer Switch Manager – Faceplate window, select **Edit Zoning** from the Zoning menu:

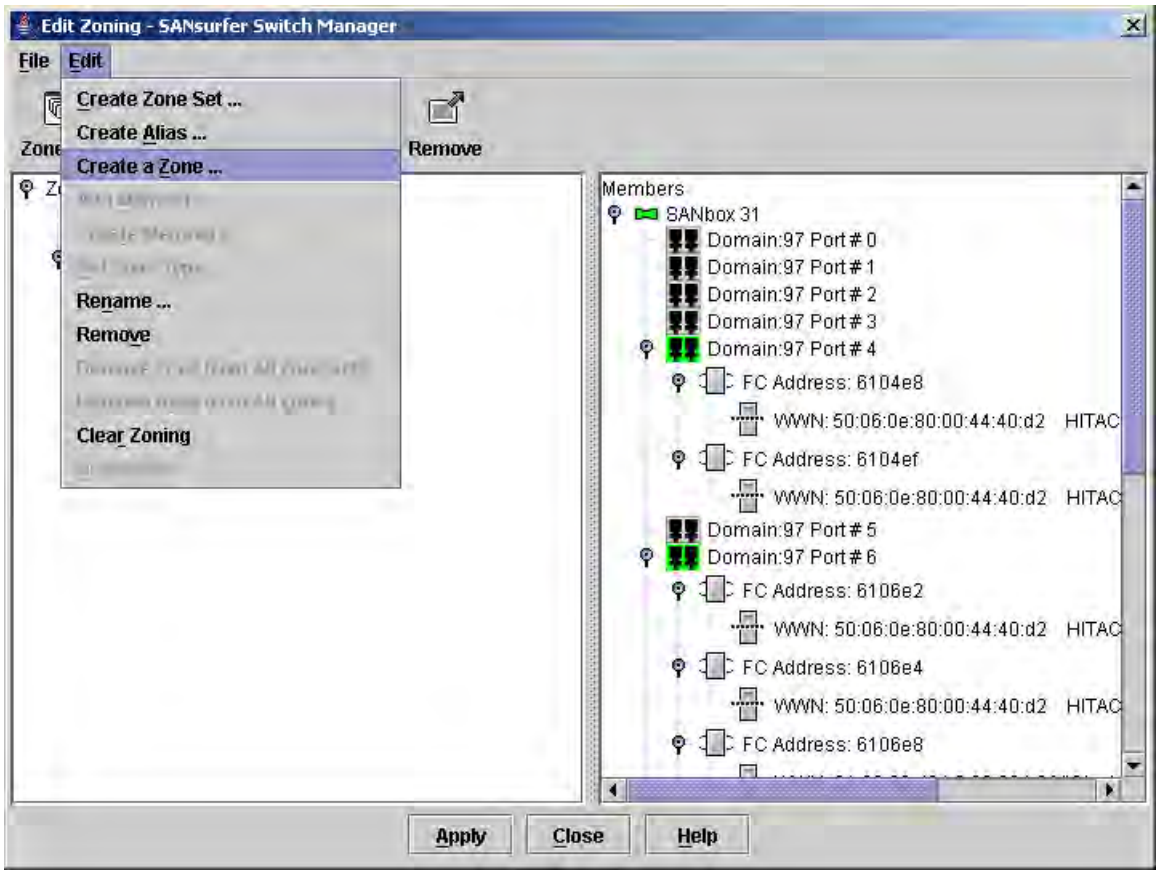


3. From the Edit Zoning dialog, select **Create Zone Set** from the Edit menu:



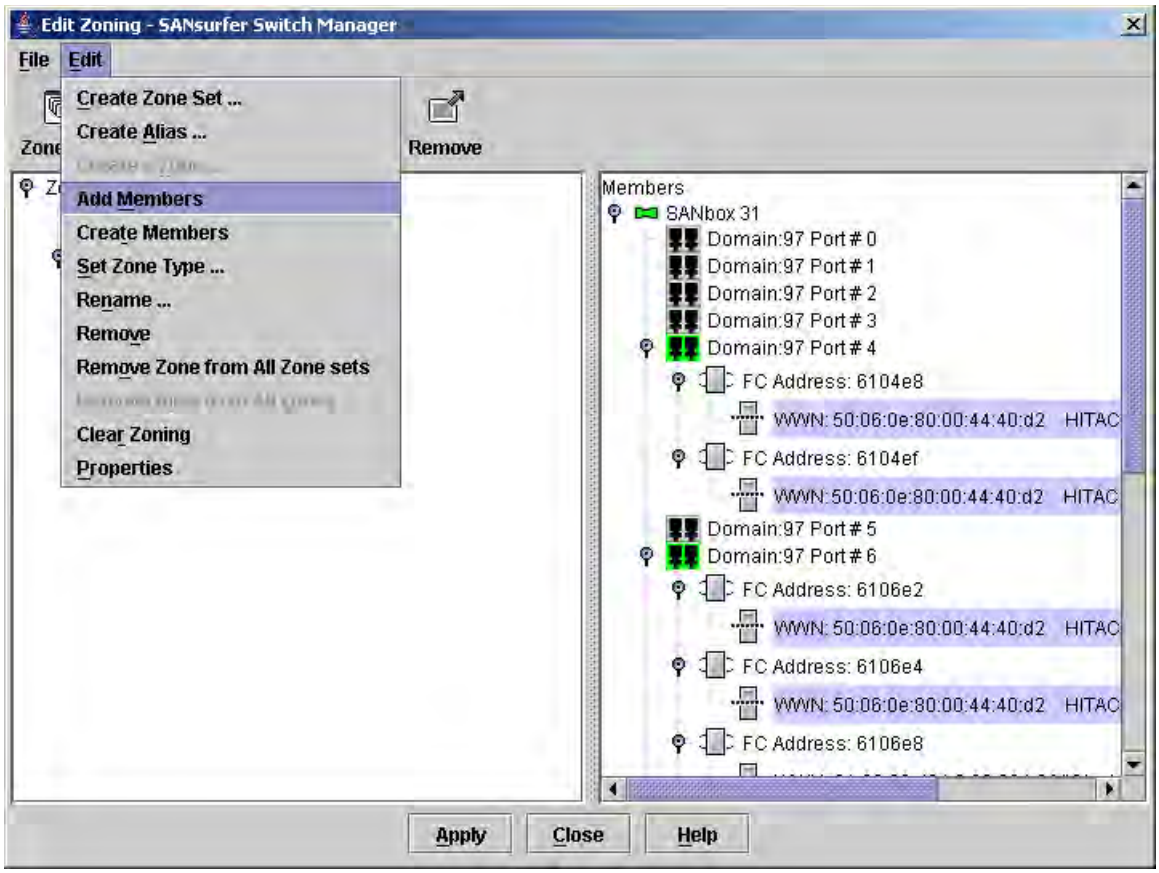
4. From the Create a zone set dialog:
   a. Enter a **Zone Set Name**.
   b. Click **OK**.

5. From the Edit Zoning dialog:
   a. Select the new zone set in the left frame.
   b. Select **Create a Zone** from the Edit menu.



6. From the Create a zone dialog:
   a. Enter a **Zone Name**.
   b. Click **OK**.

7. From the Edit Zoning dialog:
   a. Expand the zone set and select the zone in the left frame.
   b. Highlight the devices to add in the right frame.
   c. Select **Add Members** from the Edit menu.
   d. Click **Apply**.



8. From the Save Zoning & Error Check dialog:
   a. Click **Perform Error Check** and verify that no errors are found.
   b. Click **Save Zoning**.

9. If you would like to activate your new zone set now, click **Yes** and continue to step 10. Otherwise, click **No** and skip to step 13.

10. Select the zone set you would like to activate and click **OK**:

11. When the zone set has been activated, click **Close**:

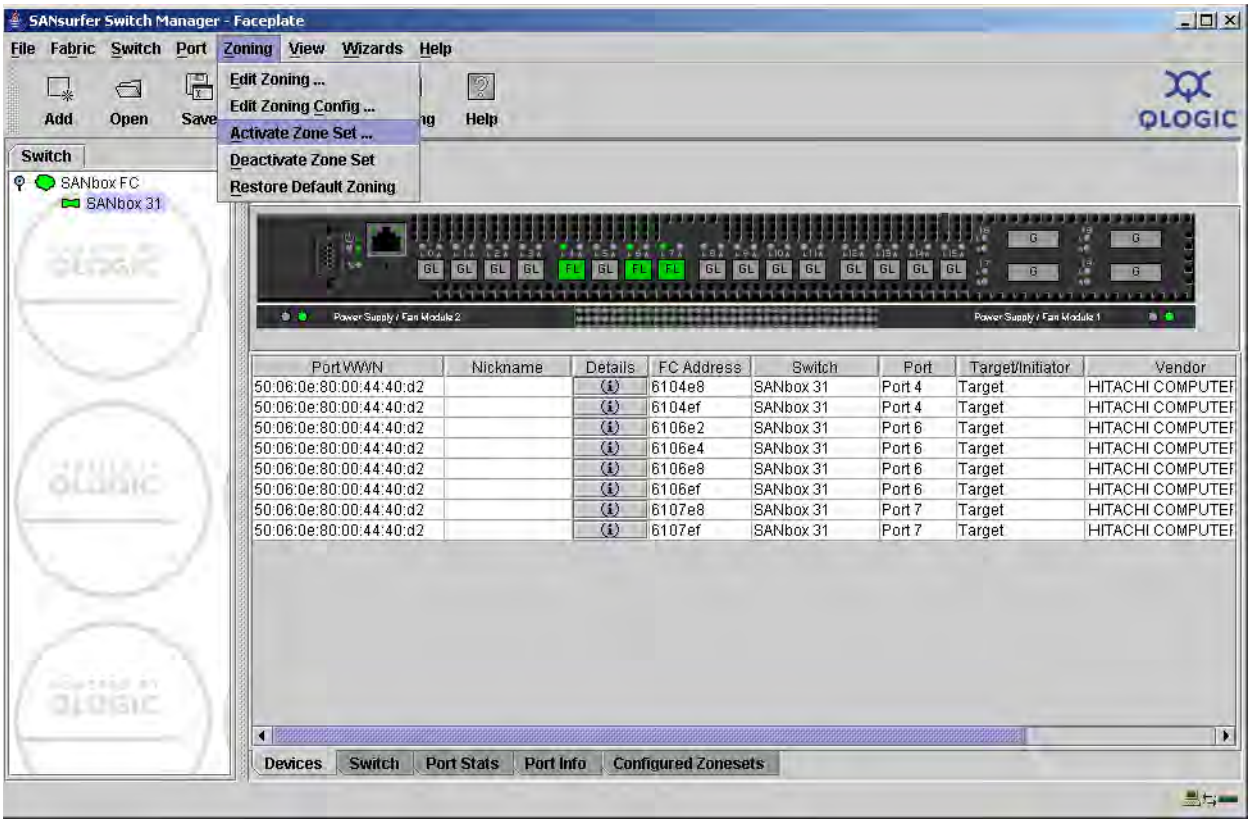
12. Click **Close** to exit the Edit Zoning dialog. Skip the remaining steps if you have activated your zone.
13. When the zone set has been saved, click **Close**:

14. Click **Close** to exit from the Edit Zoning dialog.

Activating the Zone Set Manually

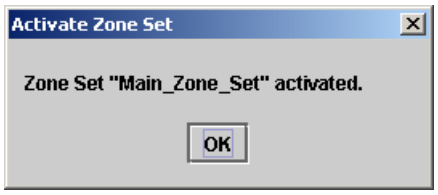
To manually activate the zone set, follow these steps:

1. From the SANsurfer Switch Manager Faceplate window, select **Activate Zone Set** from the Zoning menu:



2. Select the zone set you would like to activate and click **OK**:

3. Click **OK** to the Activate Zone Set message:



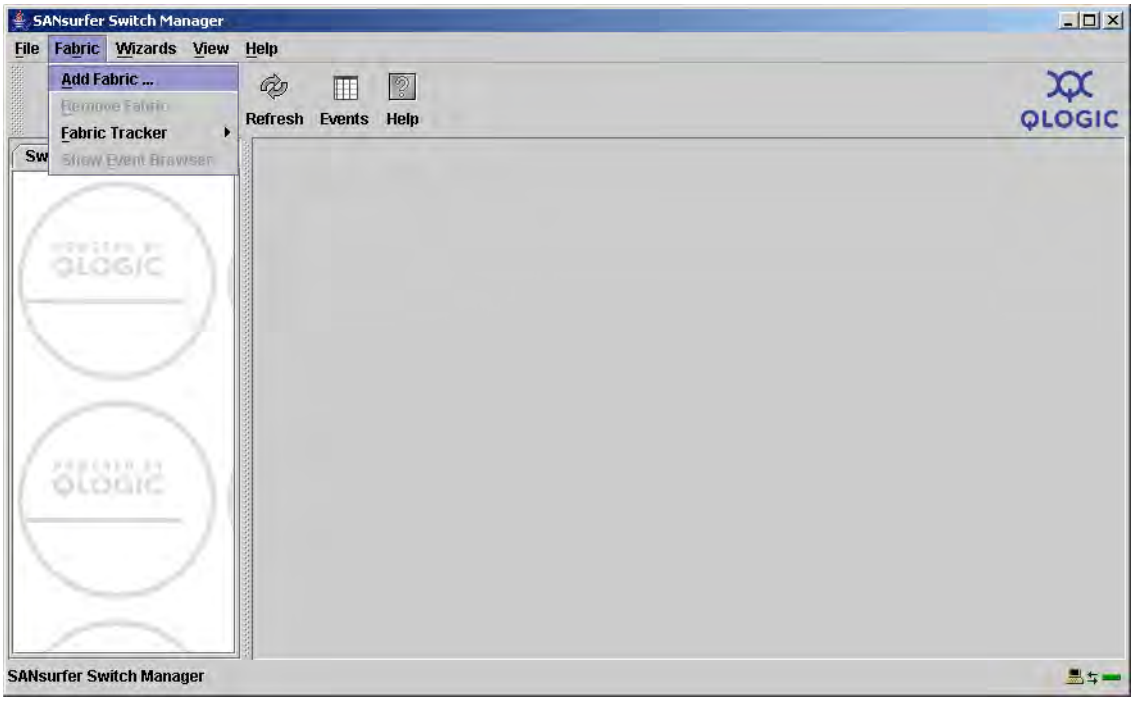
SANbox2-64 Configuration

The following procedures explain how to configure the SANbox2-64 switch, verify the connections and test your configuration:

- Configuring Port Properties
- Connecting Cables
- Configuring Zones

Configuring Port Properties

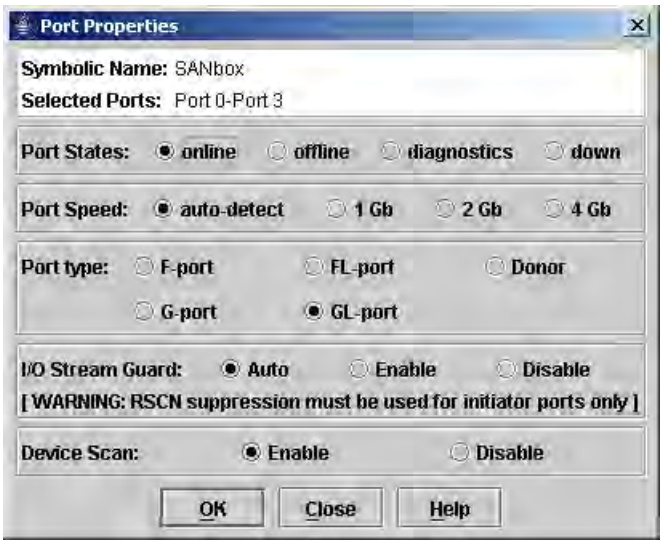
1. From the SANsurfer Switch Manager, select **Add Fabric** from the Fabric menu:



2. From the Add a New Fabric dialog:
   a. Enter a **Fabric Name**, **IP Address**, **Login Name**, and **Password**.
   b. Click **Add Fabric**.

3. From the SANsurfer Switch Manager – Faceplate window:
   a. Select the switch you want to configure.
   b. Select one or more 1/2/4Gb ports from the faceplate.
   c. Select **Port** Properties from the Port menu.

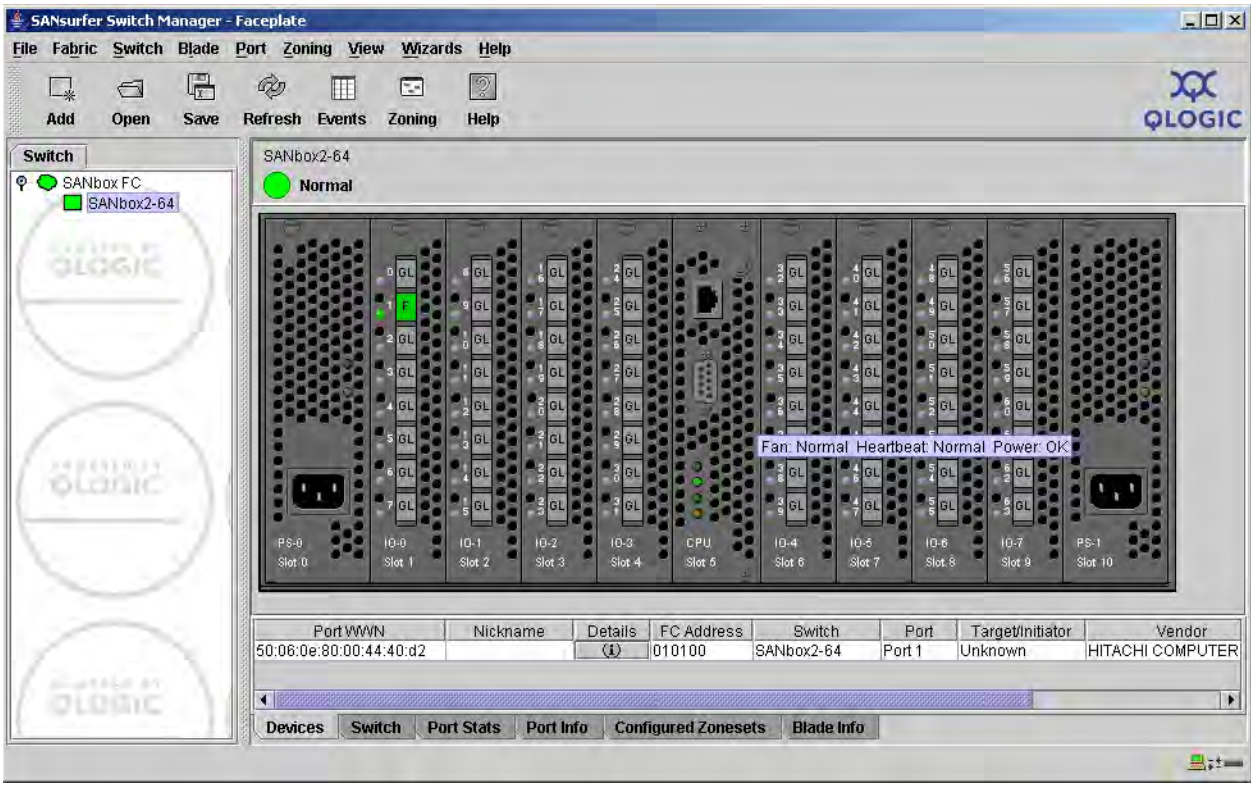
4. From the Port Properties dialog:
   a. Select the desired port settings.
   b. Click **OK**.



5. Click **OK** to close the Updating Port Properties message:

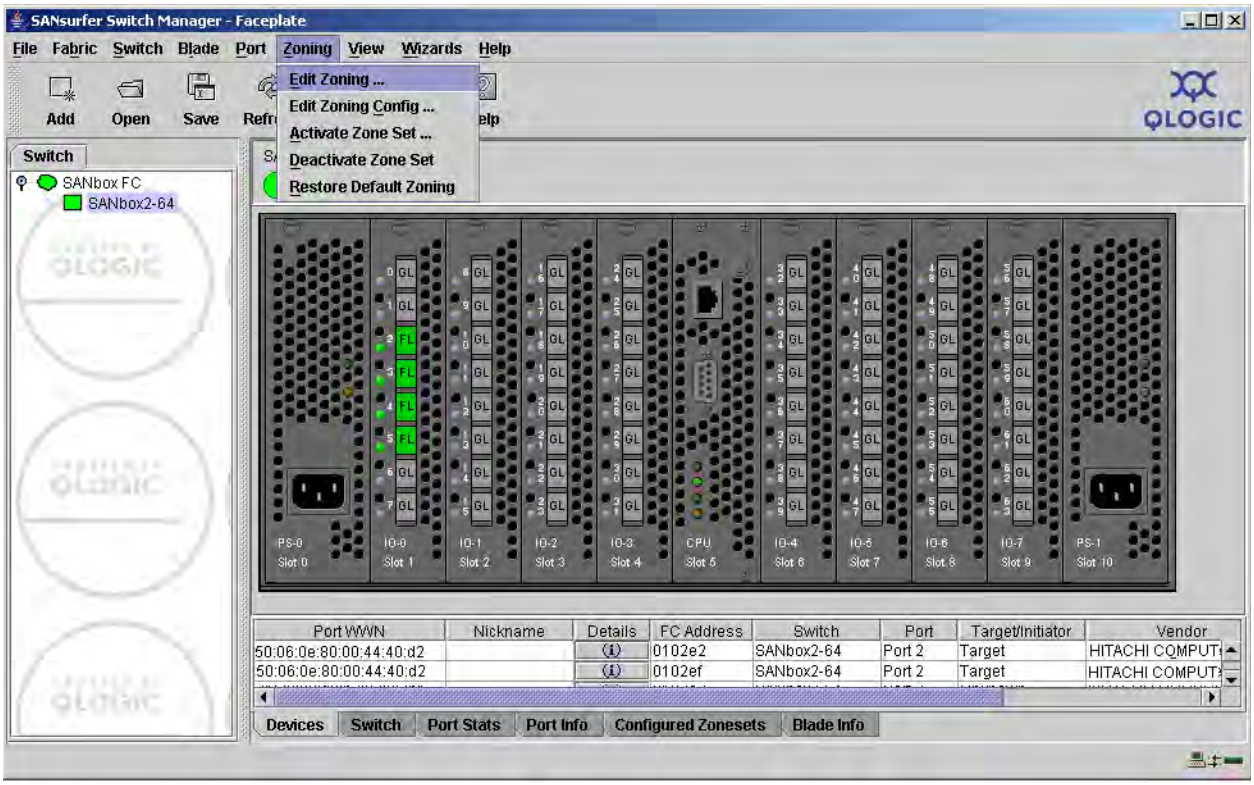
Connecting Cables

1. Connect the devices to the SANbox2-64 switch ports you configured.
2. Verify that the green Login LED is illuminated for each device.
3. Launch SANsurfer Switch Manager and connect to the SANbox2-64.
4. From the SANsurfer Switch Manager – Faceplate window, verify that all devices are listed.

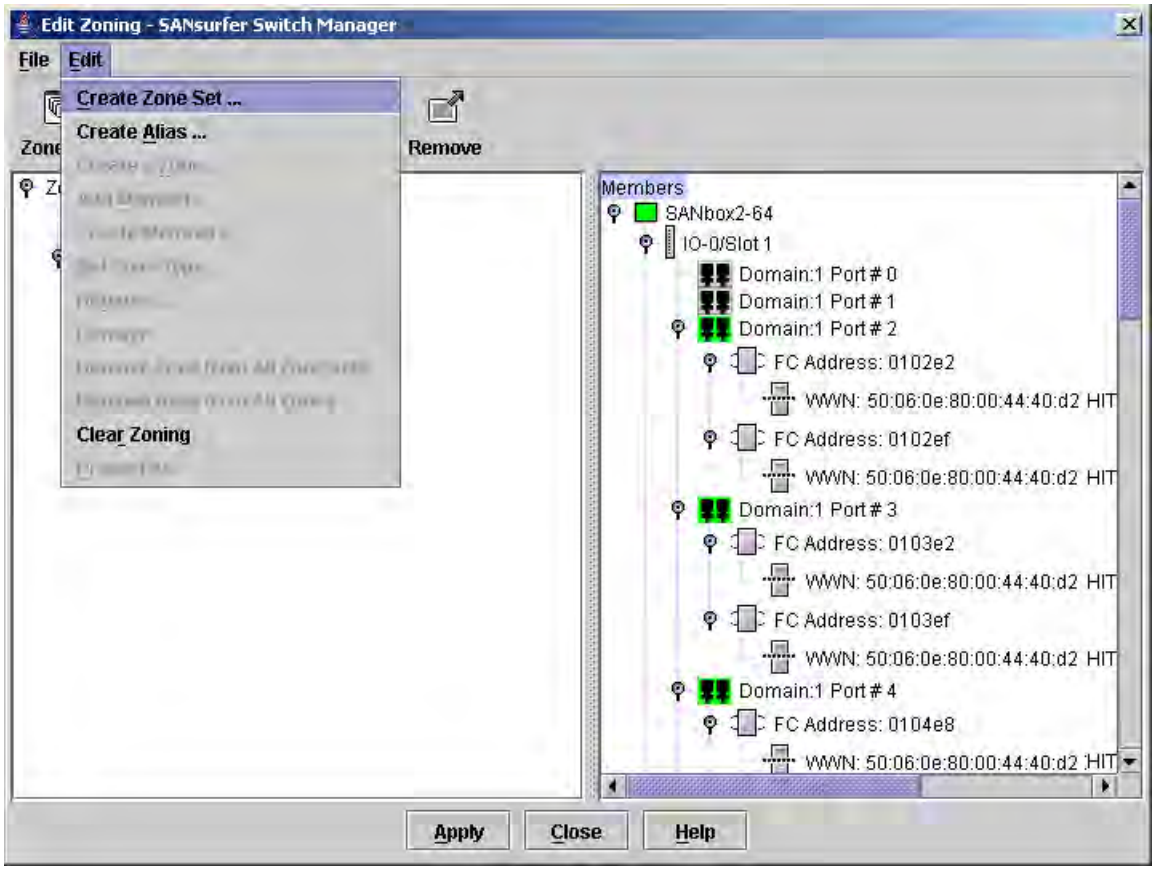


Configuring Zones

1. Launch the SANsurfer Switch Manager and connect to the SANbox2-64 switch.
2. From the SANsurfer Switch Manager – Faceplate window, select **Edit Zoning** from the Zoning menu:

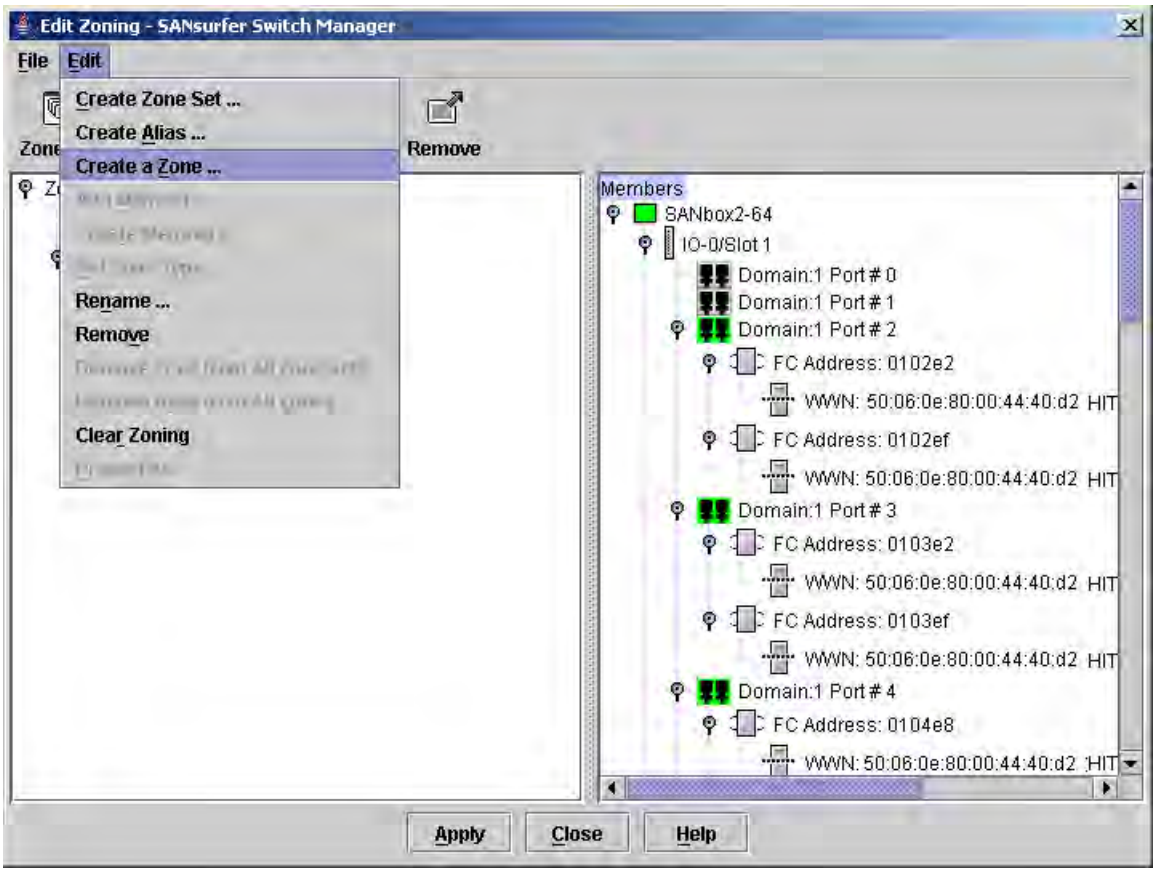


3. From the Edit Zoning dialog, select **Create Zone Set** from the Edit menu:



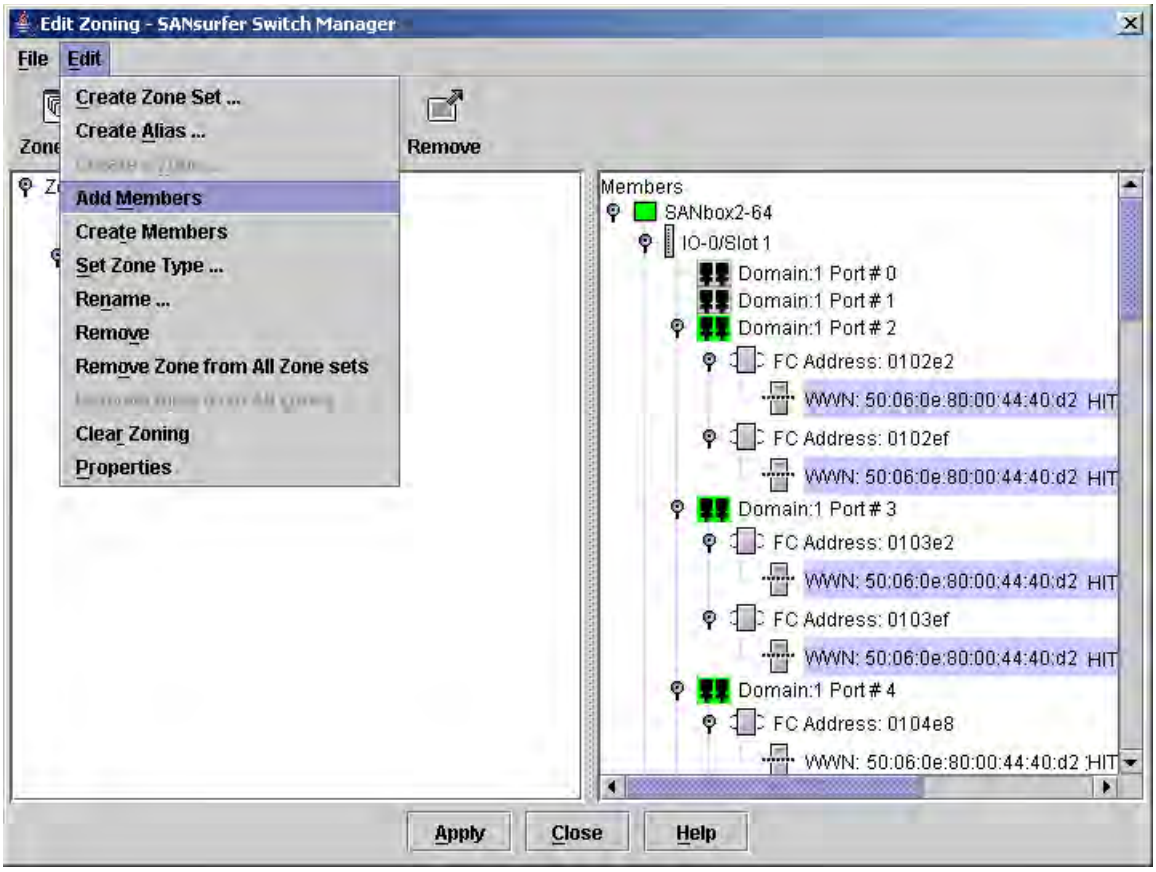
4. From the Create a zone set dialog:
   a. Enter a **Zone Set Name**.
   b. Click **OK**.

5. From the Edit Zoning dialog:
   a. Select the new zone set in the left frame.
   b. Select **Create a Zone** from the Edit menu.



6. From the Create a zone dialog:
   a. Enter a **Zone Name**.
   b. Click **OK**.

7. From the Edit Zoning dialog:
   a. Expand the zone set and select the zone in the left frame.
   b. Highlight the devices to add in the right frame.
   c. Select **Add Members** from the Edit menu.
   d. Click **Apply**.



8. From the Save Zoning & Error Check dialog:
   a. Click **Perform Error Check** and verify that no errors are found.
   b. Click **Save Zoning**.

9. If you would like to activate your new zone set now, click **Yes** and continue to step 10. Otherwise, click **No** and skip to step 13.

10. Select the zone set you would like to activate and click **OK**:

11. When the zone set has been activated, click **Close**:

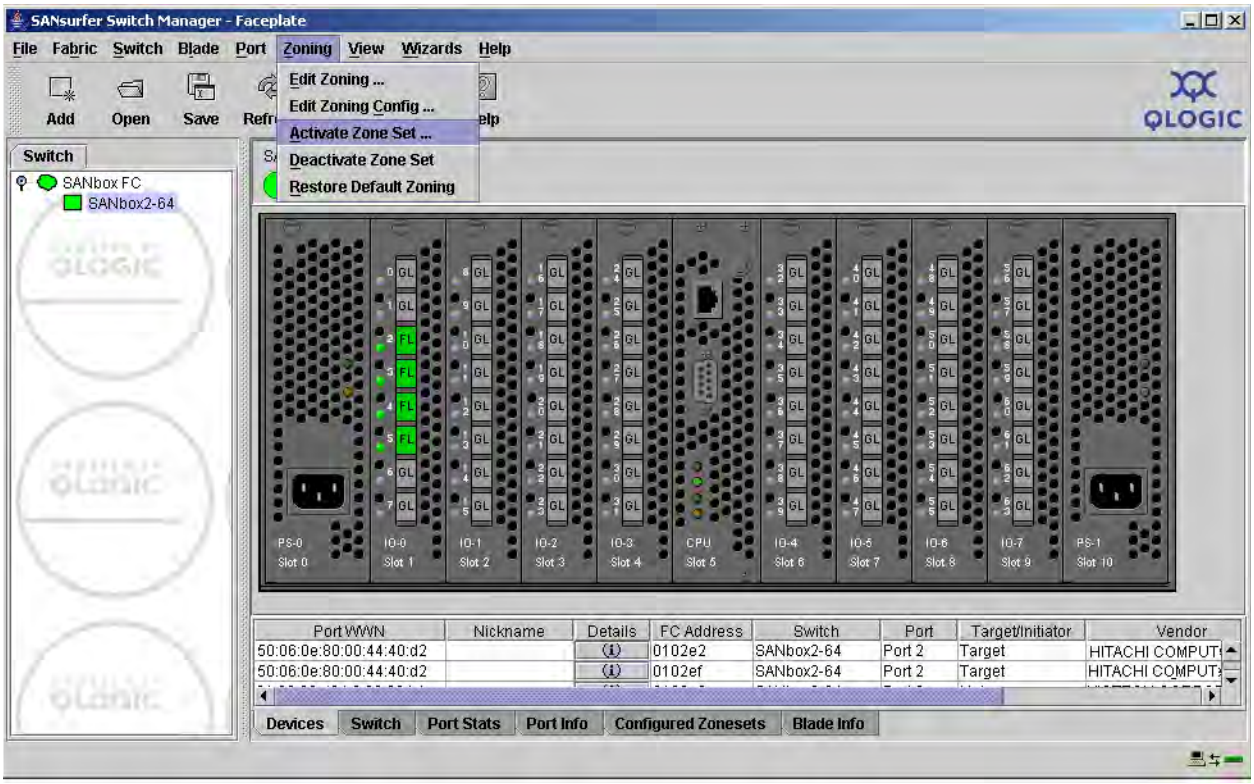
12. Click **Close** to exit the Edit Zoning dialog. Skip the remaining steps if you have activated your zone.
13. When the zone set has been saved, click **Close**:

14. Click **Close** to exit from the Edit Zoning dialog.

Activating the Zone Set Manually

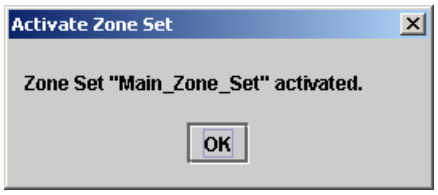
To manually activate the zone set, follow these steps:

1. From the SANsurfer Switch Manager Faceplate window, select **Activate Zone Set** from the Zoning menu:



2. Select the zone set you would like to activate and click **OK**:

3. Click **OK** to the Activate Zone Set message:



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Locations

North American Corporate Headquarters
26650 Aliso Viejo Parkway
Aliso Viejo, CA 92656
Phone: (949) 389-6000
(800) 662-4471
Fax (949) 389-6009

EMEA Headquarters
Surrey Technology Centre
40 Occam Road
Guildford GU2 5YG
Surrey, UK
Phone: (44) 1483-295825
Fax: (44) 1483-295827

APAC Headquarters
Servants International Corporation
(QLogic exclusive representative)
1-15-9 Hosoe Bldg. 4F
Kojima-cho, Chofu-shi
Tokyo 182
JAPAN
Phone: (81) 424889649
Fax: (81) 424889648

Partner Programs

Channel Programs
(877) 975-6442
reseller@qlogic.com

Interoperability Testing
solutions@qlogic.com

Business Alliances Programs
(949) 389-6557
santrackpartner@qlogic.com

Sales Education and Technical Training

Technical Training
tech.training@qlogic.com

Sales Training
sales.training@qlogic.com

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Technical Support

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Corporate Headquarters
QLogic Corporation
26650 Aliso Viejo Parkway
Aliso Viejo, CA 92656
949.389.6000

Europe Headquarters
QLogic (UK) LTD.
Surrey Technology Centre
40 Occam Road Guildford
Surrey GU2 7YG UK
+440(0)1483 295825

WWW.QLOGIC.COM

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